March 13, 1950

STEEL

The Magazine of Metalworking and Metalproducing

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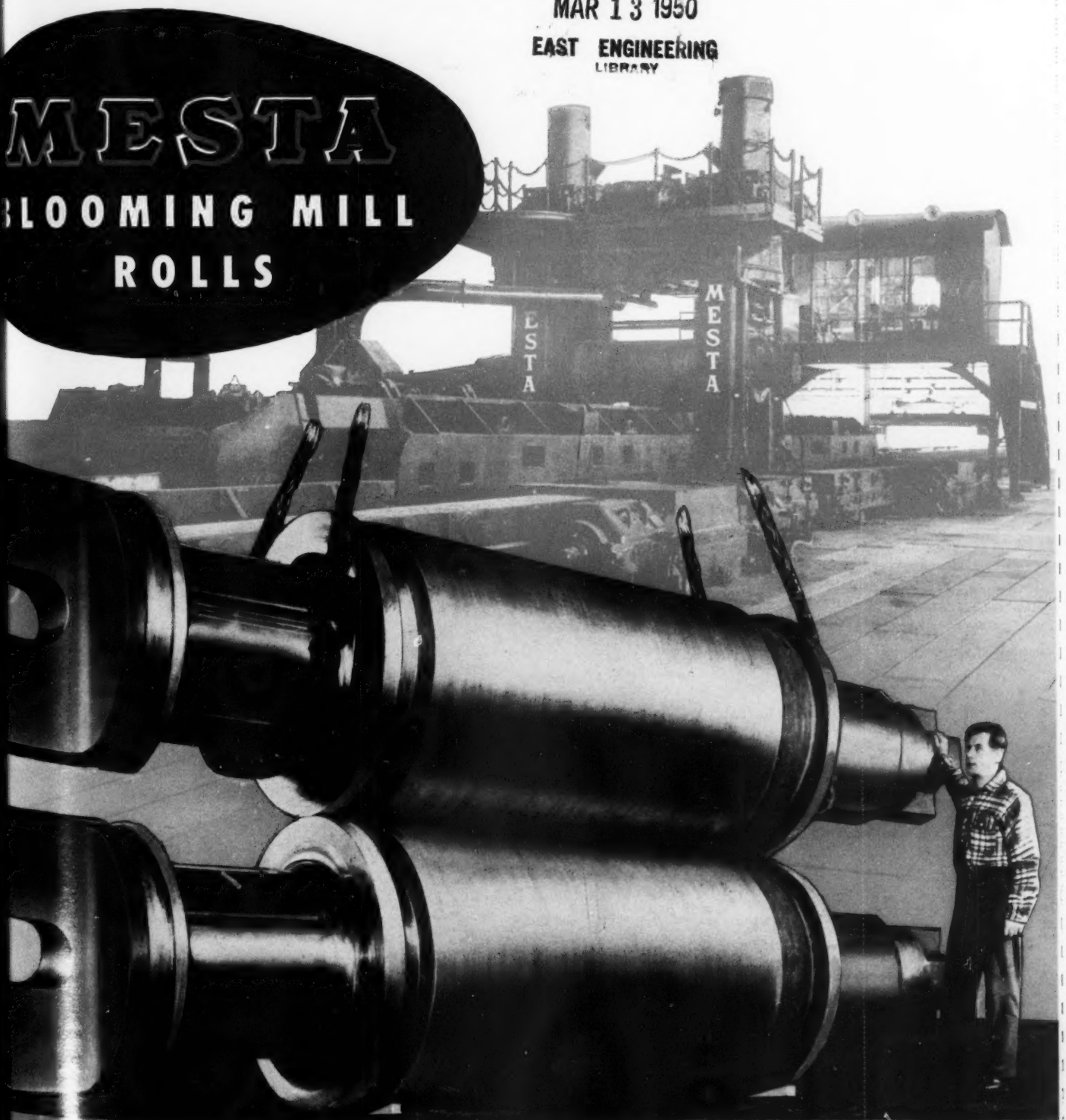

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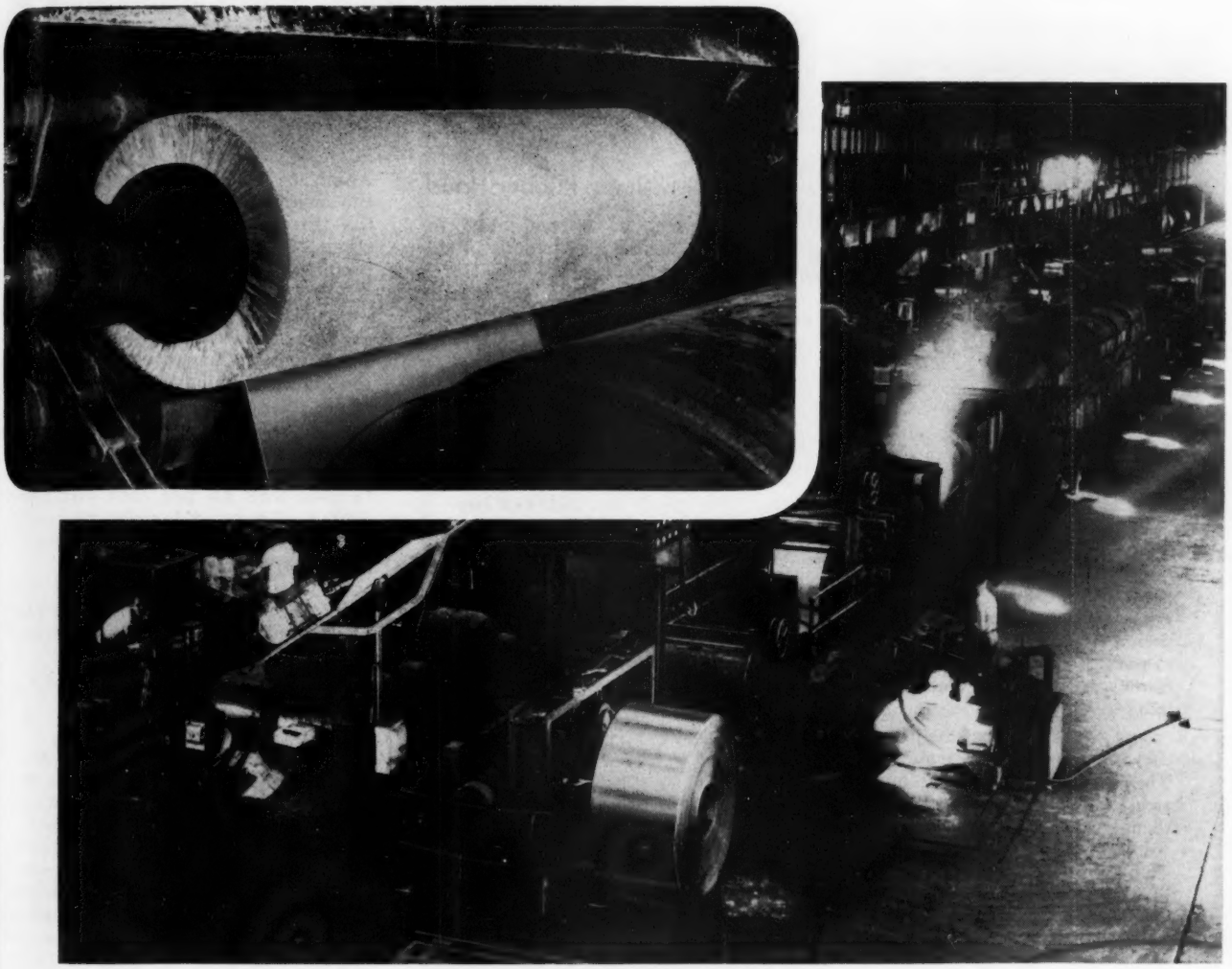

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Behind the Scenes . . .

The Clock with the Rubber Hands

Pat Dwyer Jr. is not only the artist who draws the cartoons in this publication, he's also a poet. Here's proof in a ditty, "The Clock with the Rubber Hands."

Oh, for a clock with rubber hands!
'T would give you time for all demands.
You could stretch the hours, and get things done,
And finish the things you have begun.
Elastic days would be sublime,
With everything done, and done on time.
Alas! The clocks that tick and tock
In office, plant and loading dock
Relentless count the hours away
In measured spaces every day;
So busy men who want to know
How metals, news and markets go—
Who can't find time to mark and heed
The publications they should read,
Have found a way to save a step:
They count on STEEL *to keep them hep!*
The information that they need
Is packaged neatly, quick to read;
And time they steal to keep informed
Is all so scant it's justly scorned.
Since STEEL *from time makes short demands,*
It grants you clocks with rubber hands.

Muskrats Fried in Wine

Do you know how to fry muskrats in wine? The government has a pamphlet telling you all about it.

Associated Industries of Massachusetts reports that Sen. Styles Bridges, curious to find out how the taxpayers' money is being spent today, asked all the agencies of the government to send him one copy of each of their current books, booklets and pamphlets. He received more than 83,000.

Among the subjects considered in the booklets, besides the muskrat situation, are: Bats in belfries, how to trap cats, the latest news on the Cuban frog-leg industry, the status of North America's fleas and other vital topics.

Prices, 3223 of Them

Have you ever been to Blue Bell, Pa.? If you have, you know that refractories are made there. It's one of the towns listed in STEEL's price section that carries 3223 separate price entries weekly. That's 75 per cent more than in any other medium in the field.

Market Editor Bill Rooney and Associate Editor Frank Briggs are the custodians of this section, one of the three major parts of the magazine. The others are the news and production-engineering sections.

A new method of quoting prices was started in 1948 and established as a regular service last Sept. 19. The coverage has been expanded so that it now includes price quotations of 162 separate producing companies at 274 separate plants. About 96.5 per cent of national steelmaking capacity is represented in the quotations. The 3.5 per cent not represented is devoted largely to production of tonnage not offered on the open market.

If you want to know what steel and other products are produced where and for what price, start reading on page 145.

Puzzle Corner

A few days ago we were nearly knee deep in letters about the Feb. 13 problem of the sweeper and cars. We conceded in the Feb. 27 issue that another answer—1.6 miles per hour for the sweeper and 4 miles per hour for the trolleys—was correct, besides the answer we gave—4 miles per hour for the sweeper and 10 miles per hour for the trolley. B. W. Shaw of Brockton, Mass., was one among many who pointed out that the 4-10 answer is wrong.

We're all in agreement, though, on the answer to the sandwich problem of Feb. 27: Joe gets 12 cents and Mike 18. Herman Albertine of Adams Grease Gun Corp., J. C. Tennison of Tennison Brothers, R. B. Bagby of Bagby & Co., Robert T. Griffiths of Pittsburgh Tool Steel Wire Co., Ralph Pappenheimer of Specialty Device Co. and G. T. Bradner of Lees-Bradner Co. were among those with the right answers. Mr. Bradner also gives a supplemental answer: Communist verdict—no money to anyone; Socialist verdict—each of the three gets ten cents; New Deal verdict—each gets nine cents (three cents tax).

Here's a tricky one. Find a three-digit figure whose digits total 18, and substract from it a three-digit figure whose digits total 12, and for a result get a three-digit figure whose digits total 6.

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March 13, 1950

Dangerous Report

Last week it was learned that a majority report soon to be issued by the Congressional Joint Economic Committee will contain a number of extremely dangerous proposals. One is that the steel industry be required to file new price schedules with the "appropriate" government agency (probably Federal Trade Commission), which could hold up increases 30 days while public hearings are held. Another is that Congress study the question of whether the steel industry should be considered a public utility.

None of the Republican members of the committee has signed the majority report. Presumably they will issue a dissenting minority report. Sen. Robert A. Taft says the report calls for "studies that certainly point toward price fixing." Committee Chairman Joseph C. O'Mahoney denies this.

Undoubtedly the proposals stem from the annoyance felt by Senator O'Mahoney and others last December when steel companies advanced prices to compensate for increased costs. In view of his heated remarks at that time it is easy to believe that present proposals are vindictive.

Ironically it is Senator O'Mahoney and his associates who have contributed much to the situation they now condemn. They are guilty on two counts. In their repeated espousal of inflationary increases in wages, government spending and everything else they have helped to create the higher costs which have necessitated higher steel prices.

Their second offense is that they, and not the steel companies, have repeatedly permitted synthetic national crises to postpone the time when the natural law of supply and demand would invoke intense price competition. Last fall there would have been general price reductions in most steel products had not the steel strike, aided and abetted by people like Senator O'Mahoney, intervened. Every time we approach a balance between supply and demand and the attendant likelihood of keen competition which would induce price cuts, a crisis convenient for the administration's political aims seems to occur just in time to defeat or postpone the corrective influences of the kind of competition the industry needs.

There isn't a thing contemplated in Senator O'Mahoney's proposals that can't be done simpler, better, fairer and cheaper by the industry's normal competition. The problem is to free the natural forces from government meddling so that they can work.

* * *

MORE TROUBLE AHEAD: Under the new coal contract, which runs 28 months to June 30, 1952, no reopening for wage negotiations is permitted before April 1, 1951. Presumably this assures freedom from coal shortages for at least more than a year.

Offsetting this comfortable thought is the realization that while mining has been resumed, the basic problems of the industry remain unsolved. A little simple arithmetic will show that output at the present rate will exceed consumption by an uncomfortable margin. It is easy to figure that barring unforeseen circumstances, we might have as much as 75 million tons above ground by August. Stocks of this magnitude would have an immediate effect on coal prices. Efficient mines probably could keep going profitably at lower prices but hundreds of others would be forced to close.

One would think that in self interest, the coal operators and the miners would get together on a major project to cure the industry's

(OVER)

AS THE EDITOR VIEWS THE NEWS

malady of over-production. The difficulty is that the miners' union boss is a strong-headed individual who thinks his own ideas as to what is good for the industry are the only ones worth considering.

One thing is certain. Unless owners and union can get together on some kind of a workable basis, the government will step in. This would be unfortunate as it probably would lead to government ownership eventually. —p. 63

* * *

BUILD TACONITE PLANT: Efforts to solve the problem of utilizing the taconites of Minnesota on a commercial basis are progressing faster than was anticipated. Latest development is announcement by Oliver Iron Mining Co. that it will start construction before April 1 of a new type of agglomeration plant at Virginia, Minn., for processing taconites and fine ores.

This new plant, first combination sintering and nodulizing pilot plant on the Mesabi range, will have capacity to produce 1,000,000 tons per year. In spite of this substantial tonnage, the plant is referred to by R. T. Elstad, president of Oliver, as "a major experiment" and as "one of the bold and costly steps in a $17 to $20 million program to secure basic information before building permanent commercial taconite plants." The new plant, to be built by Arthur G. McKee Co., will be completed by the end of 1950. —p. 69

* * *

CHRYSLER'S RELATIVES: Twenty-fifth annual report of Chrysler Corp., covering operations for 1949, is more informative than its predecessors. It contains some new statistical data which help to indicate how extensively the affairs of a large manufacturer affect tens of thousands of persons who serve it or are served by it.

The parent company and wholly-owned domestic subsidiaries have 107,084 employees and 66,582 stockholders. The ratio of stockholders to employees probably is lower than average. Chrysler has 6500 suppliers and 10,574 dealers. Its plants have 24,300,000 square feet of floor space. It owns 23,276 machine tools. Chrysler-built vehicles registered in the United States number 8,987,049.

Last year Chrysler's net earnings averaged more than a half-million dollars per working day. To date its strike has caused a loss in earnings of $17.5 million. Figures in the preceding paragraph provide a hint as to how the strike hurts relatives of the Chrysler economic family—employees, stockholders, suppliers, dealers and others. —p. 77

* * *

"PAPER WORK" REDUCED: Lincoln Electric Co. is boldly ignoring convention in revamping operations to fit into the new one-floor 500 x 1400-foot plant being built by the Austin Co. in Cleveland. As a result of study of mock-ups of production lines, Lincoln has eliminated traditional departments and Austin in turn has eliminated wall after wall in the new plant. The outcome will be a "stockroom with manufacturing space adjacent to the stock."

One basic change is the substitution of visual inventory controls for troublesome paper work. Inventory storage is at the point of use. Activity hinges on the amount of stock actually in sight, not upon what the stock records show, usually erroneously. This one step has enabled Lincoln to transfer 34 clerks from inventory and control records to productive work and to cut the number of inspectors in half.

If you abhor paper work as much as most executives do, check into the advantages of visual inventory control—stock stored at point of use. —p. 68

* * *

SMITHING IS VERSATILE: Twenty-third in the series on "Fundamentals in Steelmaking" is a treatise on production of forgings by Waldemar Naujoks, the first installment of which appears in this issue. The author, whose authoritative writings on forge shop practice are familiar to readers of this publication, points out that hot working of metals is divided into two general classifications—hot rolling as performed in rolling mills and hot forging as done in forging shops. He then goes on to classify forgings in four groups—smith forgings, drop forgings, forging machine forgings and press forgings.

Readers of the current installment probably will be impressed by the versatility of smith forging. Forgings made by this process range in size from small hand chisels weighing a few ounces to large rings, cylinders or blanks weighing over 200 tons. No other process of hot working of metals—rolling or forging—turns out products of such a wide range in weights. —p. 106

E. L. Shaner

EDITOR-IN-CHIEF

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News Summary

COAL—Look for metalworking production to climb back quickly to the high levels it had attained before and during the early part of the coal strike (p. 63). Steel ingot operations will recover to 85 per cent of capacity this week. Things have been patched up again in the coal industry, but the basic problem—excess production—remains. Going full tilt, the industry will mine enough coal to build stocks above ground to a new peak of 75 million tons by August. What then?

SECOND-QUARTER OUTLOOK—The metalworking industry should be set for a second-quarter sprint now that the high coal hurdle has been passed (p. 82). Construction activity is excellent. Machinery sales prospects are promising. Automakers are canceling cutbacks (p. 77). Oil-field equipment makers expect a steady volume (p. 67).

LABOR ROUNDUP—Although the unions have won their social programs in important places—coal, basic steel, Ford and some other metalworking plants—the secondary drive on industry for pensions is bogging down (p. 63). Many union locals want insurance and small wage concessions more than pensions. United Steelworkers has relatively few "pension pattern" contracts with metalworking companies. Companies having contracts with the leftist UE find their plants are battlegrounds as the new IUE of the CIO tries to move in. Ford has signed a UAW contract, but 95 per cent of the auto and parts industry is not yet in the fold. If and when the union reaches a settlement with Chrysler and General Motors, expect a renewed drive against small members of the industry.

STEEL PRICES—Sen. Robert A. Taft calls the O'Mahoney committee report on the January hearings to study steel price boosts a "great mistake" because it provides a wedge to permit the government to fix steel prices (p. 65). Senator Taft objects to these committee proposals: 1. That the steel industry be required to file new price schedules with the "appropriate" government agency which could hold up the increases 30 days while public hearings are held on the proposed higher prices; 2. that Congress study the question of whether the steel industry should be considered a public utility.

TACONITE—Venezuelan and Canadian iron ores will assume increasing importance in coming years, but so will domestic-produced taconite (p. 69). Oliver Iron Mining Co., a U. S. Steel Corp. subsidiary, and Erie Mining Co., in which several steel and ore companies have an interest, are pushing ahead on their ore-concentration programs. Before Apr. 1, Oliver will start construction of a new type agglomeration plant at Virginia, Minn. This is part of its $17 million to $20 million taconite development plan.

FOREIGN—Labor difficulties are mounting in Western Europe (p.74). The wage freeze in Britain may thaw as unions press for pay boosts. Besides Communist-inspired strikes in France, economic walkouts are being called. Workers want $8.50 more a month. West German unions want to nationalize the Ruhr steel industry.

HERE AND THERE IN INDUSTRY—Automotive, oil and gas and farm equipment industries in 1949 took more steel than in any previous year (p. 66) . . . Eastern railroads will ask permission to cut freight rates on selected iron and steel products by 25 per cent on carloads over 80,000 pounds . . . Jones & Laughlin Steel Corp. will build six open hearths, each with a capacity of 250 tons (p. 69) . . . Carnegie-Illinois Steel Corp. is building a new plant at South Chicago that will use byproducts gases for power generation (p. 67) . . . The annual tax burden, now $267 for every individual in the U. S., would be $433 by 1955 if Congress approves the 15 new spending programs asked by the President (p. 70) . . . Chambersburg Engineering Co. has a process that gives high tensile strength and ductility in a new casting alloy; magnesium added to high carbon cast iron transforms the graphite from the normal flake form to spheroidal form.

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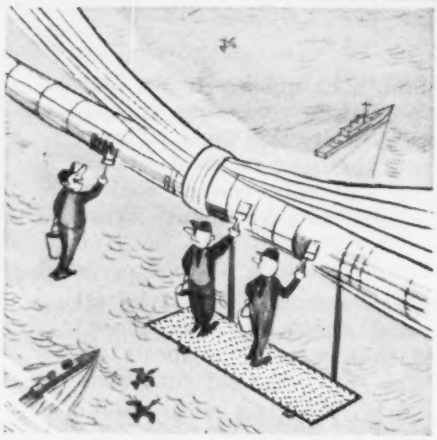

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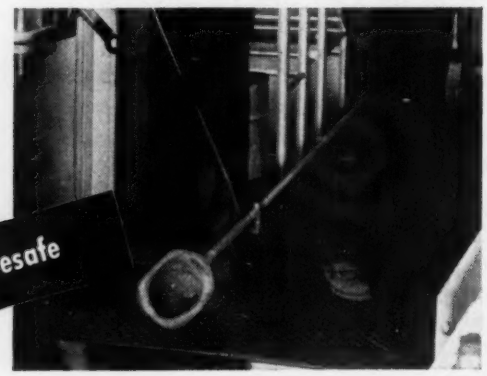

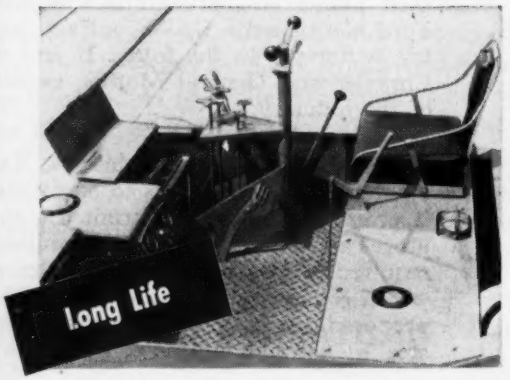

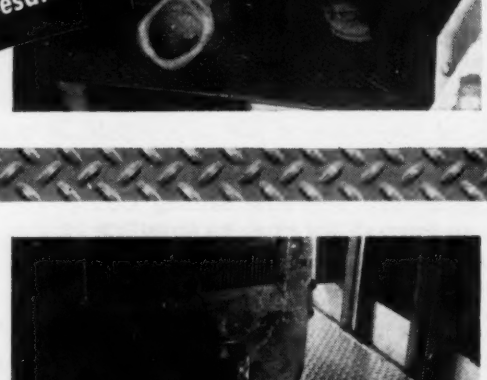

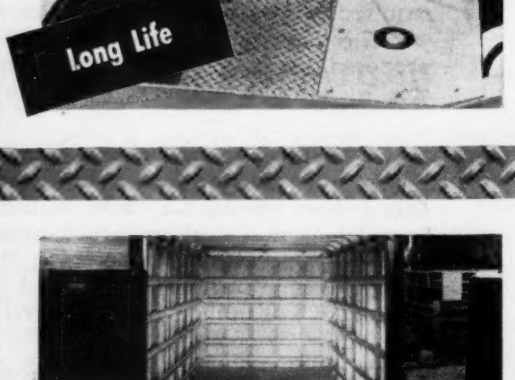

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STEEL
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Coal Still Sick Industry

New mine agreement likely to result in surplus by midsummer. Too many mines and too many miners preventing stabilization of supply and demand

COAL again is flowing to coke ovens, steel mills, metalworking and utility plants. Industrial production is climbing back toward prestrike levels. Steelworks operations averaged 75 per cent of capacity last week; they will recover to near 85 per cent this week.

The new coal contract runs for 28 months to June 30, 1952. No reopening for wage negotiations is permitted before Apr. 1, 1951. The "willing and able to work" clause has been stricken from the new agreement and "memorial" stoppages are limited to five days a year.

Coal Still Problem Child—But the basic difficulty of the coal industry—excess production—has not been corrected. Until this problem is solved, coal troubles will continue to plague industry.

Bituminous coal output this week will be about 13 million tons. Over the next four to six months, output should average about 12.5 million tons weekly, assuming a 5-day work-week and no abnormal interruptions.

Consumption from March through August should average 8.5 million tons weekly, on the basis of anticipated industrial and domestic use. About 4 million tons will be added to stocks weekly.

Excess by August — That means coal above ground would reach a new high of about 75 million tons by August (see chart), allowing for miners' holidays and normal interruptions. Before that the market will grow shaky. Price concessions will be demanded that only the more efficient mines can grant. The less efficient mines may be forced to close. Thousands of coal miners will find themselves on a no-day work-week, not by edict from John L. Lewis, but because their mine operators can find no market for their product.

The history of labor relations in coal hardly suggests that peace can be maintained in the coal fields under those conditions.

Many Markets Lost—Much of the difficulty in coal can be traced to lost markets. Part of the market loss can be laid on the doorstep of John L. Lewis and the United Mine Workers. Their demands and their strikes have increased the costs and made uncertain the availability of coal—two of the major reasons for transfers to oil and gas as sources for heat and energy.

Economists for the soft coal industry estimate production over the next five years will average between 400 and 450 million tons annually. Last year with all its strikes and three-day work-weeks, output was about 440 million tons.

Production of 400-450 million tons a year will be enough to provide 250 work-days a year for 250,000 miners, or 200 work-days for 300,000 miners. About 370,000 miners currently are employed in the bituminous mines. The question is: What is to be done with the 70,000 to 120,000 displaced miners?

Inquiries Scheduled—Several moves are underway to study the illness of the coal industry. President Truman has asked congressional leaders to approve a 9-member commission to undertake a long-range study of the industry. The commission would consider the size and character of the industry necessary for good economic health and national security.

The coal industry has proposed to co-ordinate its dealings with the union under one man—reportedly Harry M. Moses, head of U. S. Steel's coal and coke units. Under the plan, Mr. Moses would leave U. S. Steel and devote all his time to the problems of the coal operators.

Costs Higher — The latest contract settlement will increase the cost of mining coal by about 20 cents a ton on an average. The miners were awarded 70 cents a day in wage increases and an additional 10 cents a ton royalty for the miners' welfare fund.

Average coal production per miner runs 6½ to 7 tons a day.

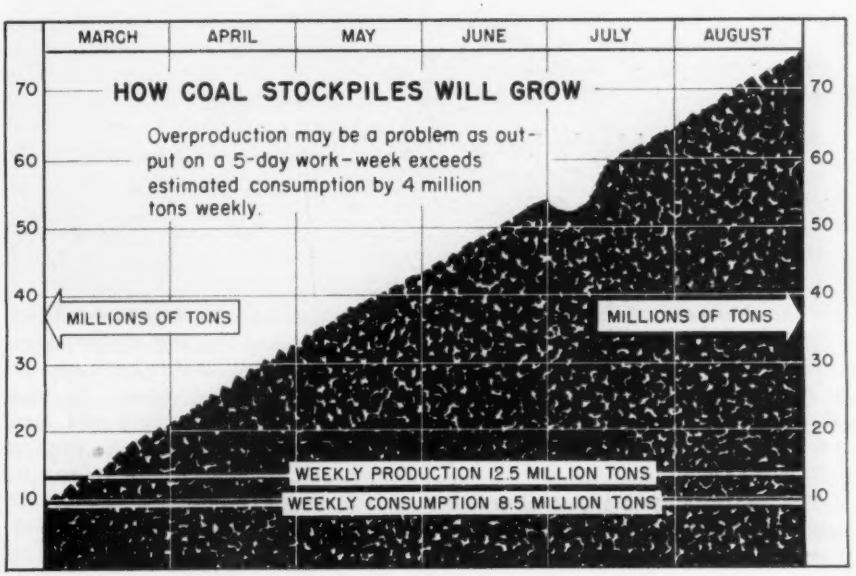
Fourth Round Bog

Bulk of wage and welfare demands against metalworking companies not yet settled

WAGE AND WELFARE concessions just won by the United Mine Workers represent the "fourth round" settlement in the coal industry. What has happened to the fourth round wage and welfare demands in the metalworking industries?

Contrary to popular opinion, many of these have not yet been settled. While public opinion focused on the basic steel and Ford agreements giving workers $100 a month pensions and social insurance in a 10-cents-an-hour package, the bulk of the metalworking industries either has not settled with their unions at all or granted considerably less.

Enthusiasm for Pensions Fades—The demand for pensions bogged down when it hit the secondary lines of industry. Many of the local union leaders wanted insurance and small wage concessions more than pensions. The smaller companies demurred that



the cost of pensions exceeded their ability to pay.

Many local unions made a general demand for pensions to conform with the program of their international union, but are not pushing these demands.

A considerable number of metalworking companies have granted increased social insurance benefits. A few have granted moderate wage increases.

Here is the situation by unions:

Fabricators Unsigned

The United Steelworkers of America-CIO has about 2200 contracts with steel producers, foundries, mining and metalworking companies.

The basic steel producers signed with the union last fall, granted $100-a-month pensions, including social security, and contributory insurance plans. Basic steel settlements include 150 contracts among 60 companies.

Of the other 2050 contracts, about 300 were settled before the basic steel pattern was established. Mostly, these represented settlements on the basis of increased insurance coverage. Many of these contracts will be up for renewal this spring and summer.

Since the steel pattern was established, 260 contracts have been concluded with metalworking companies. Less than 50 per cent of these were settled on the basis of company-financed pensions. In some cases the settlement was on the basis of the steel fact finding board's recommendation of 4 cents an hour for insurance and 6 cents an hour for pensions.

Many other metalworking contracts are under negotiation. Union negotiators are not insisting on the basic steel pattern where the size of the company, competitive or financial position prohibit such a settlement. The union is disposed to negotiate these contracts on an individual basis. In most cases, negotiators are stressing increased insurance benefits rather than pensions.

UE-IUE No Man's Land

War between the CIO-expelled United Electrical, Radio & Machine Workers of America and the newer International Union of Electrical, Radio and Machine Workers of America-CIO has made a battleground of hundreds of plants with UE contracts.

When the CIO booted out the UE at its October convention, on grounds of commie domination, collective bargaining in these plants was thrown into suspension.

The battle between the rival unions will be decided in representation elections staged by the National Labor

Relations Board. Until the board determines which plants are to be represented by the UE and which by the IUE-CIO, there can be no effective bargaining.

IUE Wins at GM—First major test of strength resulted in victory for the IUE in elections held at five General Motors plants. The CIO union won by an 8½ to 1 margin.

Labor observers generally believe that the IUE will win the elections in most of the larger plants. The UE likely will make a better showing in the smaller plants where it may have strong local organizations.

In a poll of 136 plants by the National Industrial Conference Board, membership in 41.9 per cent of the plants favored affiliation with IUE and 34.6 per cent favored representation by UE. Plants favoring the IUE represent a substantially larger number of employees than those favoring UE affiliation.

UE Gets the Dues—As the incumbent union, UE is collecting a major share of checkoff monies. In some plants where NLRB elections are pending the checkoff monies are being held in escrow.

Employers "Neutral"—Plant management is keeping hands off in this jurisdictional fight.

IUE with backing of top CIO officials is concentrating on winning the larger plants from the left-wing union.

IUE stewards can be spotted easily in the larger plants by their 5-inch badges.

Demands Await Elections—While the unions are fighting among themselves, they are unable to press demands against employers. As soon as the elections are held and local organizations completed, the winning union can be expected to reform its fourth round demands—originally for a $500 a year wage-welfare package—and come knocking at your door.

UAW Settlements Lag

The United Auto Workers-CIO won the first major pension settlement—at Ford—but failed to extend this settlement to any considerable segment of its industry. Observers in the auto and parts industries believe 95 per cent of the industry has not been signed to fourth round agreements. Holding out are two of the Big Three, Chrysler which is now struck, and General Motors against which demands have just been made.

If and when the union reaches a settlement with Chrysler and General Motors, you can expect a renewed drive against the smaller members of the industry.

As in other unions, the drive for pensions comes more from the top officers of the union than from the local leaders or the workers. The latter are more interested in improved insurance benefits and in wage inequity adjustments that may give them a few more cents an hour.

$200 Pensions in Decade—Walter Reuther, UAW president, still is plugging for more and larger pensions. "Give us 10 years and we'll build it brick by brick to $200," he promises Chrysler strikers.

Referring to the Ford contract, Mr. Reuther said the company will pay $70 of the $100 pension, while $30 comes from social security. "If the social security is increased to $50, then the company will pay only $50. When bargaining reopens, then we will ask for $125 pensions."

GM Demands Total 31 Cents—The union is asking a wage-welfare package of General Motors totaling 31 cents an hour. Included are $125 pensions, comprehensive hospital and medical coverage, severance allowance, wage increases and "other economic" demands.

The union calls for discontinuing the cost-of-living escalator clause written into the contract in 1948, although it would retain and increase the "annual improvement factor" (an annual automatic wage increase in recognition of increased productivity through technological advances).

In asking for $125 pensions, the union says its demand is based on three fundamental principles: 1. A fully guaranteed plan through the establishment of an actuarially sound trust fund maintained through fixed payments through the company; 2. administration by a joint board; 3. full financing by the company.

Point 1 is the bone of contention in the Chrysler strike and figures in current arguments over the implementation of the Ford plan. Points 2 and 3 are included in the Ford plan

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but are being resisted by Chrysler.

Up Vacation Demands—The union asks more liberal vacation allowances of 40, 80 and 120 hours, depending on length of service. Present vacation allowances are 40, 60 and 80 hours.

Severance pay allowances of 40 hours per year of service up to 10 years and 56 hours per year after 10 years with a maximum allowance of 1040 hours are demanded.

Wage increases totaling 9 cents an hour are asked as follows: 1. Elimination of the differential between General Motors and the current industry pattern (the union estimates this now amounts to 1 cent an hour, due to the escalator clause); 2. increase in the annual improvement factor in the years 1948-49 from 2 per cent to 3 per cent, which the union figures would come to 3 cents an hour; 3. application of the 3 per cent improvement factor in 1950 to current hourly rates, which would come to 5 cents.

Other Economic Demands—The union also wants triple time for holidays worked, time and a half for Saturdays and double time for Sunday work as such.

Of course, the union dropped two demands which it was expected to advance: Union shop and a guaranteed annual wage.

Kaiser Workers Get Raise

Kaiser Aluminum employees at the Trentwood and Mead plants in Spokane, Wash., have negotiated wage increases ranging up to 9½ cents an hour. The two plants employ about 3300 workers affiliated with the United Steelworkers of America-CIO.

The general wage increases will total about $500,000 annually, and back pay granted in some work classifications will amount to about $300,000.

Workers also will receive $2000 company-paid life insurance policies, providing accident benefits and $100 monthly pensions for totally disabled workers over the age of 65.

Unemployment Rises

Employment remained stable between January and February, says the Census Bureau. Total civilian employment was estimated at 56,953,000 in the week ended Feb. 11, about the same as in the week ended Jan. 14.

Unemployment reached 4,684,000 during the February survey week, the highest since August, 1941. The February survey was made before the full effects of the coal strike began to show in the statistics; the jobless total doesn't include those on strike.

Government To Fix Steel Prices?

Senator Taft charges that the O'Mahoney committee report on steel price hearings calls for "studies that point toward price fixing." GOP to file a minority opinion

THE CONGRESSIONAL Joint Economic Committee is issuing a report that could be a wedge in the door to permit the government to fix steel prices.

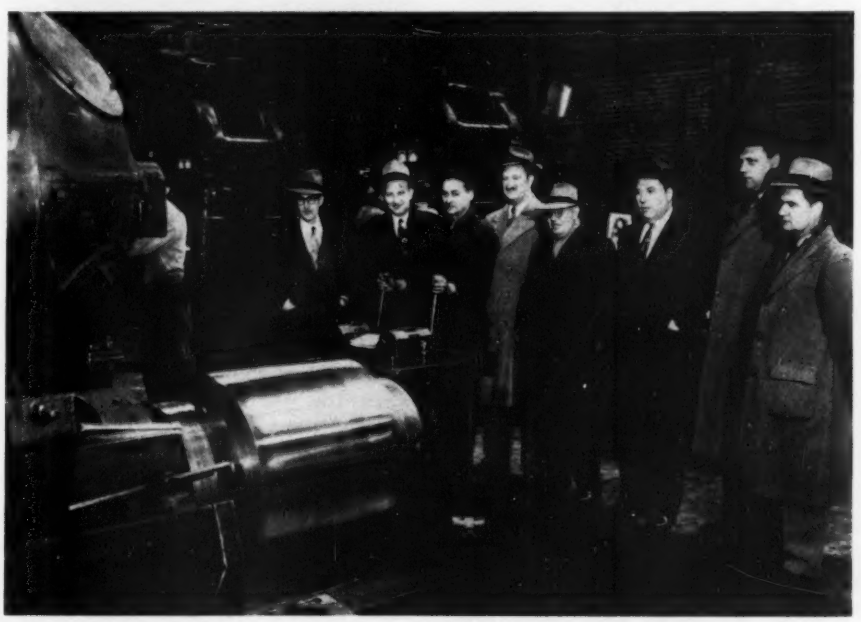
Committee Chairman Joseph C. O'Mahoney (Dem., Wyo.) denies that the report suggests steel prices be fixed. Sen. Robert A. Taft (Rep., O.) says the report calls for "studies that certainly point toward price fixing." None of the Republican members of the committee signed the report; they are filing their own opinion. The report comes as a result of the committee hearings in January on the chain of steel price boosts that began last December.

Great Mistake—Senator Taft labels the majority report a "great mistake" and objects to these proposals in it: 1. That the steel industry should be required to file new price schedules with the "appropriate" government agency, probably the Federal Trade Commission, which could hold up the increases 30 days while public hearings are held on the proposed higher prices; 2. that Congress study the question of whether the steel industry should be considered a public utility. "If the steel industry were considered a public utility," says Senator Taft, "it would be subject to government regulation and presumably its prices would be fixed."

Rep. Robert Rich (Rep., Pa.) discloses that a third provision to which Republicans object would require steel companies to file a statement of their costs and prices with the government. "It's a socialistic document in every sense of the word," says Representative Rich.

Wrong Emphasis — Senator Taft thinks a Congressional study of the situation in steel prices should be confined to whether there is competition in steel. Such a study is the fourth major proposal in the majority report. He contends that the committee report "should look toward more competition" rather than toward "price regulation by the government."

Sen. Ralph E. Flanders (Rep., Vt.) told STEEL: "The report assumes that manufacturers should not lay aside reserves out of which to pay for new equipment. Another assumption is



KEEN OBSERVATION: Watching a roller operate a cold-roll strip machine at Cuyahoga Works of American Steel & Wire Co. in Cleveland is a group of company salesmen who visited the plant as part of the first sales conference since 1938. About 400 salesmen attended conferences in Chicago, Cleveland and New York to prepare for the highly competitive era expected in the steel industry. With the group pictured here are: H. L. Jenter, general superintendent of the Cuyahoga Works (second from left), John Graham, general sales manager of the company (fourth from left), and William M. Rooney (fourth from right), market editor of STEEL

that expansions are inflated replacements that should be financed by the sale of new stock issues instead of out of earnings. This presumption casts doubt on the whole process by which companies large and small have grown and strengthened the whole economy of the U. S. These are questions which cannot be answered soundly without a lot more time and study than the committee has devoted to them."

Members Listed—Majority Democratic members of the committee are: Senators O'Mahoney, Francis J. Myers (Pa.), Paul Douglas (Ill.), John J. Sparkman (Ala.), Representatives Edward J. Hart (N. J.), Walter B. Huber (O.), Frank Buchanan (Pa.), Wright Patman (Tex.). Minority Republican members are Senators Taft, Flanders, and Arthur V. Watkins (Utah), Representatives Rich, Christian A. Herter (Mass.), Jesse P. Wolcott (Mich.) Sen. O'Mahoney now is preparing a bill embodying the majority proposals which normally would be referred to the Senate Banking & Currency Committee for consideration.

Oleo Sleeper

WHAT DOES oleomargarine have to do with metalworking? A good deal when President Truman signs the oleo bill passed by the House and Senate.

The bill contains a sleeper providing for a fine up to $5000 a day for "failure or neglect" to obey a Federal Trade Commission order. It applies to all FTC regulations over all business under the commission's jurisdiction.

More Steel for Autos, Oil, Farm Equipment

AUTOMOTIVE, oil and gas, and farm equipment industries last year took more steel than in any previous year. This was despite a decline in total steel shipments.

While records were set in those three classifications, the shipbuilding and marine equipment industry, aircraft, ordnance and other military uses, also received more steel than in 1948, says the American Iron & Steel Institute.

Autos Take 10.9 Million Tons — Automotive manufacturers took nearly 700,000 tons more last year than in 1948. Total shipments to this industry in 1949 were more than 10.9 million net tons, or 18.8 per cent of total steel shipments, compared with 13.4 to 15.5 per cent of shipments in other postwar years.

The oil and gas industry, for drilling, pipe lines, refineries and similar uses, took nearly 4.5 million tons of steel last year, compared with close to 4.3 million tons or 6.5 per cent in 1948, which in turn was far above the industry's buying in earlier years.

Construction Up—Building including such contractors' products as plumbing and hardware, but excluding oil and gas construction, got a higher proportion of steel shipments than in any other year since 1942, when war building was at its height. The total of 12.1 per cent last year compared with 11.6 per cent in 1948 although the actual tonnage was slightly below the figure for the preceding year.

Jobbers and dealers who serve mainly the thousands of small enterprises in the country, received 8.8 million tons, 15.2 per cent of total steel shipments last year, a percentage slightly higher than in the previous two years.

Farm Machinery Gains—Manufacturers of agricultural equipment received 1,468,000 tons or 2.5 per cent of the total, both figures being slightly higher than in other years.

Among industries taking smaller tonnages as well as percentages of steel in 1949 than in 1948 were railroad transportation, machinery, electrical equipment, appliances and utensils. As a result of curtailed demand by railroads and their suppliers, that industry declined from fifth to sixth place as a buyer of steel, being replaced by oil and gas.

Containers Take Less—Container manufacturers took less steel than in 1947 or 1948, but their percentage remained unchanged at 8. Shipbuilding and marine equipment got 1.1 per cent of steel shipments, the first time since the war that their portion has crossed 1 per cent.

Total shipments of steel in 1949 were 58,104,000 tons, nearly 7,870,000 tons less than in 1948. The decline was due mainly to the steel strike in October, shipments in the first nine months having been almost identical with those of a year earlier.

Steep Rock Dredges for Iron Ore

STEEP Rock Iron Mines Ltd. will begin dredging in April at a second lake in its ore reserve near Atikokan, Ont., 140 miles northwest of Port Arthur, Ont., on Lake Superior.

Water has already been drained from the basin, but 40 million cubic yards of gravel and silt remain to be dredged hydraulically from the bottom before the first ore from the Hogarth mine can be removed. Dredging is expected to take about three years, but there is a good chance that mining will start in 1952. Steep Rock's first mine, the Errington, was opened in 1945 at the bottom of the first lake to be drained. It produced 1,133,966 tons of iron ore last year. When Hogarth production is in stride, combined output of the two is expected to amount to from 3 million to 4 million tons annually.

Inland Steel Co., Chicago, has taken an option to lease from the mining company acreage containing a third basin to be explored for ore.

Board chairman of Steep Rock is Cyrus S. Eaton, Otis & Co., Cleveland.

Lower Rates To Aid Scrap

THE IRON and steel scrap industry expects the freight rate reductions proposed by eastern railroads (STEEL, Mar. 6, p. 52) to cover scrap also.

Principal advantages that would accrue to consumers are reported to be: 1. Widening of area in which high quality of scrap could be sought; and 2. possible lower cost of scrap to consumer.

While the ability to reach long distances to procure scrap is highly important in times of scrap scarcity it is valuable the rest of the time in maintenance of high quality, brokers being enabled to go farther afield for the best material.

Whether lower rail freight rates would make much of a cut in scrap prices is problematical. Consumers buy scrap on a delivered price basis, the shipper paying the freight. Price reductions from freight rate cuts would depend on how well the seller fares financially and competitively.

The eastern railroads are proposing substantial reductions in rail rates on certain iron and steel products to meet truck competition. Scrap is reported to be moving in increasing volume by truck. In some instances trucks have been hauling finished steel to consumers and returning with scrap. Southern railroads are expected to announce reduced rates in ferrous scrap by April.

Atom Energy for Submarine

WESTINGHOUSE Electric Corp., Pittsburgh, is developing a nuclear power plant to operate a submarine with atomic energy. The work will be expedited at its new atomic energy laboratory under construction at Bettis Airport, Pittsburgh, which will be completed in several months.

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Gusher Is Over

But pipe sales should continue at present high levels through the summer

THE GUSHER is over, but business is fairly good for the oil industry—and for oil-field equipment makers.

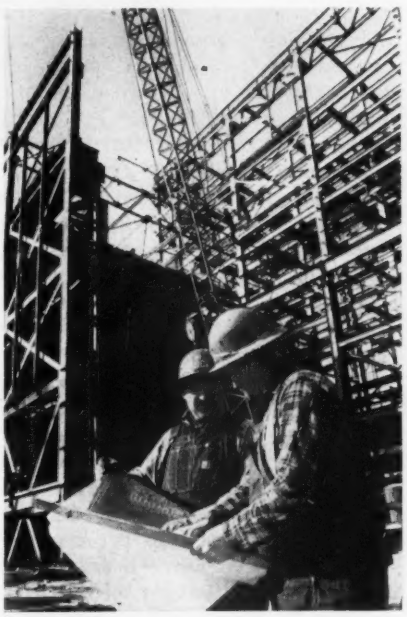
Oil Well Supply Co., a subsidiary of U. S. Steel Corp., says "present indications point to a steady demand for equipment during this year." National Supply Co.'s president, A. E. Walker, is not so optimistic. He admits that excess supply over demand in oil "has had an adverse effect on oil-field equipment and supply sales, but general pipe sales should continue at present high levels through the summer of 1950."

Oil Output Off—Crude oil production in 1949 fell from postwar peaks as the industry went into a shakeout period following the immediate postwar boom. Signs indicate that the shakeout is still continuing. Bunker fuel oil prices fell as much as 15 cents a barrel early this month. The coal strike may cut short this shakeout phase, the second of three traditional cycles through which American industry passes after war. The third phase, steady expansion, may start in oil this year. Effects of the coal strike on conversions to oil won't be felt for a while because it is not practical to install new oil-burning equipment in utility and industrial plants until late spring.

Consumption of three of the four major refined petroleum products is already up. On the basis of current consumption, oilmen are now predicting that gasoline use in 1950 will be 4 per cent above the 1949 level; kerosene will be up 6 per cent or more; light oils will be up 14 per cent; heavy oils may be down 2 per cent or may be about the same. Heavy oil consumption in 1949 maintained high levels despite the decline in other products. Power companies alone used 66,302,548 barrels in 1949, 55 per cent over 1948.

Fly in the Oil—Yet there's one fly in the oil: A disproportionate amount of the rise in crude oil production this year may come from foreign fields, particularly Arabia and the Near East, where dollar shortages curtail American oil-field equipment companies' business. National Supply Co. says "the value of our products required to produce a barrel of oil in foreign fields is much less than the average capital expenditures per barrel of oil produced in the U. S."

The continuing shakeout phase in the oil industry and foreign produced oil may be factors prompting product expansion and improvement programs among oil field equipment companies. Oil Well Supply Co.'s new products include: A high-capacity power slush pump; a line of triplex plunger pumps for repressuring, acidizing or cementing; a dual pump drive designed to fit converted armed service LST and YF vessels used in off-shore drilling; a new grade of high tensile strength sucker rods for pumping 8000 to 10,000-foot wells; a three-horsepower pumping unit for shallower wells; gas booster and compressor units for gas conservation; and an automatic weight control which controls the total weight on a drill bit.



CARNEGIE-ILLINOIS STEEL CORP.
. . . to get giant power station

Carnegie Builds Power Plant

ENOUGH power for a city of 150,000 will be added to Carnegie-Illinois Steel Corp.'s generating capacity at South Chicago. Construction of the addition to its No. 5 power station has begun, American Bridge Co. erecting the steel.

Heart of the addition will be a 60,000 kw steam turbine. Carnegie engineers say this will be the largest single-shaft condensing turbine built for an industrial power installation.

President Clifford Hood sets completion date of the project late this year or early next. Its purpose, he says, will be to utilize by-product gases for power generation.

Packaged Industrial Steam Plant

VAPOR HEATING Corp., Chicago, which so far has built some 2500 steam generating plants for heating diesel-powered trains, finds it is getting into the industrial field. The industrial models made by the company are capable of supplying up to 15,000 pounds of steam per hour for intermittent and emergency heating, pile driving, processing ready-mixed concrete and similar uses.

They can take in water at 60°F at one end and discharge steam at 200 psi from the other end, all in the space of two minutes. Thermal efficiency is 82.1 per cent, compared with about 50 per cent in older industrial steam plants.

Company's railroad installations date back to 1933 when a compact steam generator became necessary for heating early diesel-powered streamliners. As trains grew longer the steam generating capacity of the company's units kept pace. Growth in capacity from 2000 pounds per hour in the first unit to 4000 pounds in present units was achieved with little change in floor area requirements. Additional installations were made aboard diesel-powered naval vessels during the war to supply steam for heating and operating evaporators.

In both railroad and naval installations diesel oil is used to fire boilers because it is already carried aboard. Industrial steam generators operate on either gas or No. 3 fuel oil. One gallon of fuel oil delivers 12 pounds of steam.

Steam generator's combustion chamber is made of Inconel and the high temperature portion has a refractory lining. Local high temperature protection is afforded by air jacket passing continuously over the fire pot. Coil section exterior is lagged with corrugated asbestos.

Carnegie Opens Zinc-Coating Line

ANOTHER chapter in the steel industry's history of technological improvement is being written on continuous zinc coating.

Carnegie-Illinois Steel Corp., the latest contributor, will within another week begin operating a zinc-coating line at its Gary, Ind., Sheet & Tin Mills. Producing coils by a continuous hot-dip method, the U. S. Steel Corp. subsidiary will offer the product in 19-gage and lighter. The line's capacity will be 5000 tons a month. Sheets will have a maximum width of 48 inches.

Another Chicago-area mill, that of Inland Steel Co. at Indiana Harbor, Ind., expects to have its continuous galvanized line in operation in about a year. It is licensed to use Armco Steel Corp.'s patented process for coating flat-rolled steel in a molten zinc bath.

Solve Problems? Lincoln Eliminates Them

J. F. Lincoln describes the new plant that Austin Co. is building for him as "a stock room with manufacturing space around the stock." Inventory control is visual

LINCOLN ELECTRIC Co. licked some of its production problems in a novel way: It eliminated instead of solving them.

By adoption of visual inventory controls, paper work was eliminated and 34 persons once required to keep inventory and control records and to handle materials from storage to production were relieved of their nonproductive labors and transferred to productive work. The number of inspectors was cut in half.

Storage takes place at the point of use and is handled in marked spaces where the mass of material on hand clearly indicates if the supply is running low. If it is, a man on each line alerts one of the limited number of stock-area men. (The accompanying cut along a welder assembly line shows the way that all material is delivered from primary manufacturing departments to the point of next use.)

Labor Cost Cut—It cost Lincoln about $80,000 to set up a complete mock-up of production lines to be installed at its new one-floor 500 x 1400-foot plant being built by Austin Co. in Cleveland.

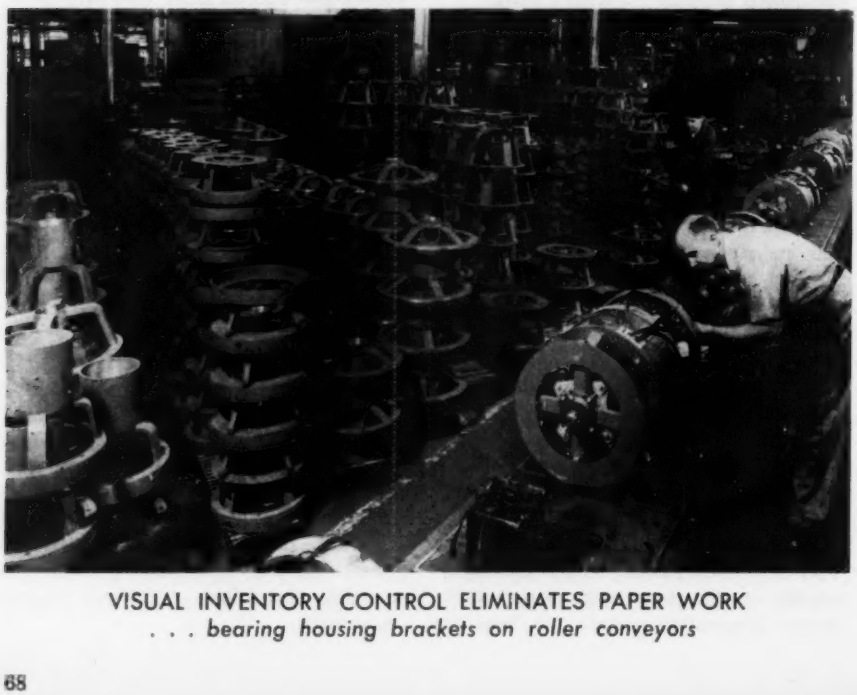
The mock-up has already paid for itself twice over. Direct labor costs were reduced about 10 per cent in 1948 and another 10 per cent in 1949. Most of the savings were met by a complete rearrangement of materials storage and production sequences that are now integrated in conveyorized production lines. The need for closer integration of manufacturing sequences led to cutting out some operations entirely—accomplished partly by redesign.

Manufacturing Stockroom—Hamilton Beatty, who co-ordinated Austin Co. work on the new Lincoln plant, points out that bold thinking by J. F. Lincoln, president of the welding manufacturing company, led to the elimination of department after department. Austin, in turn, eliminated wall after wall for the new plant. Mr. Lincoln describes the project as "a stockroom with manufacturing space adjacent to the stock."

No material in the new plant is to be moved more than twice—once as raw material, again as a subassembly or as a finished product. Overhead handling in the new plant will save 20 per cent on the floor space required for the operation.

Visual Controls More Accurate—About visual inventory controls, Mr. Lincoln has this to say: "The only purpose served by inventory records is to deceive you as to what you've really got. You can always be sure that you're at least 10 per cent off—at least we've never been able to do better than 90 per cent. Often we're a lot worse. In the new plant we'll have visual controls that won't let us go wrong."

He looks at the flexibility of the new plant layout this way: The structure can be extended by additions at either end—without disrupting any work going on in the original plant. Areas within the plant proper will be so flexible as to permit individual lines or groups of lines to be contracted or expanded easily. Actual costs on the production of nonstandard items in isolated lines can be determined accurately.



VISUAL INVENTORY CONTROL ELIMINATES PAPER WORK
. . . bearing housing brackets on roller conveyors

Wing Consolidates Three Plants

L. J. WING Mfg. Co., manufacturer of heating, ventilating and combustion equipment and steam turbines, consolidated its three separate factories in Newark, N. J., in a single factory building at Linden, N. J.

Wing produces unit heaters, steam or gas types with motor or turbine drives and with fixed or revolving discharge outlets; process heater sections; forced and induced draft fans and blowers; auxiliary steam turbines; elbow and straight line duct fans; ventilating fans for industrial and marine applications; and industrial fog eliminators.

Ideal Industries Buys Tincher

J. WALTER BECKER, president of Ideal Industries Inc., Sycamore, Ill., announces the purchase by his company of the entire business and assets of Tincher Products Co., Chicago manufacturer of the Tincher process for sealing porosity in castings.

The company will continue to operate under the name, Tincher Products Co., but as a wholly owned subsidiary of Ideal Industries.

Mr. Becker says A. B. Tincher, originator of the process, will continue with the company in an active sales-engineering capacity.

Ferguson Acquires Conover

H. K. FERGUSON Co., industrial engineers and builders of Cleveland, New York and Houston, acquired O. D. Conover Engineering Co., Cleveland.

Conover is a foundry design and construction specialist. Staff of the Conover organization will form the nucleus of a newly established Foundry Division within H. K. Ferguson, says Otto F. Sieder, executive vice president and general manager. Oliver D. Conover will head the new division. Acquisition of Conover was by outright purchase.

Metal Removal Program Started

STEEL FOUNDERS' Society of America, Cleveland, initiated a special program to investigate and evaluate all known information about the re-

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moval of excess metal normally developed in producing steel castings.

F. Kermit Donaldson, executive vice president of the society, says experimental studies are being carried out in a selected steel foundry with the co-operation of a recognized university engineering and research organization. Scope of the project is being extended through industrywide co-operation.

Member foundries are contributing individual experience records; they're also pooling information on equipment and suggestions on possible design changes or new equipment.

PMI Studies Cold Extrusion

PRESSED Metal Institute's 1950 technical symposium will deal with cold extrusion of steel and prejudging and testing of sheet and strip metals. The symposium will be held in the Hotel Carter, Cleveland, Mar. 16-17.

These subjects will be covered in the session on cold extrusion of steel: Military interest; history and experimental phases of cold forming of steel; lubricants' part in cold forming of steel; and press development for cold extrusion of steel.

NMTBA May Form Ad Council

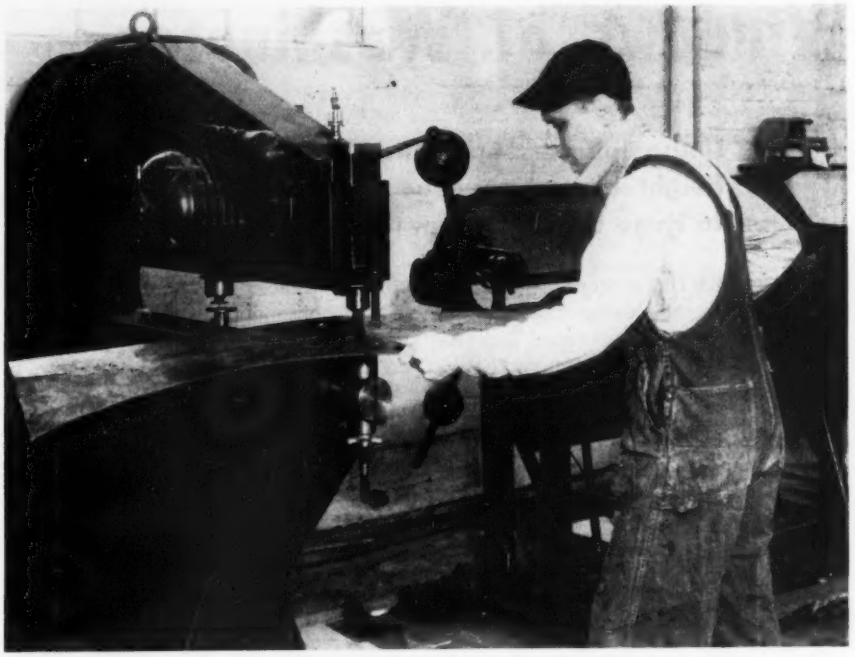
PROPOSAL for formation of a machine tool advertising council has been presented to the board of directors of the National Machine Tool Builders Association and, while the board has not acted, there are indications that the new organization will be approved.

Organization plans were presented by J. E. Louden, advertising manager of the Cone Automatic Machine Co., Windsor, Vt., at a meeting in Cleveland attended by 69 executives representing 56 machine tool companies.

Objectives include development and use of the experience, ideas and contacts of the machine tool industry's own advertising men in connection with industry-wide public relations and sales programs.

At the meeting, L. W. Scott Alter, president, American Tool Works, Cincinnati, said that all advertising should be aimed at top management.

In visiting many plants, Swan E. Bergstrom, sales manager, Cincinnati Milling Machine Co., Cincinnati, found that management is more replacement conscious than ever before. Tapping this replacement market is the job for both sales and advertising, he said. Donald M. Pattison, vice president in charge of sales, the Warner & Swasey Co., Cleveland, endorsed formation of the council.



SHEAR DELIGHT: The new Baker Tru-Edge Shear, capable of cutting irregular shapes in either mild or stainless steel sheets up to 3/16-inch thick is now in production at Baker Brothers Inc., Toledo, O. Attachment for circle cutting and strip cutting is provided. The shear may be used to cut to a scribed line or by template. No starting hole is necessary for inside cuts. The machine, Baker officials say, leaves a burr-free edge

U. S. Steel To Build Taconite Plant on Mesabi

DEVELOPMENT of foreign iron ore sources for American use has been spotlighted and headlined in recent weeks but work on transforming United States taconite into usable ore is not lagging.

Oliver Iron Mining Co., a United States Steel Corp. subsidiary, is starting construction of a plant at Virginia, Minn., for experimental agglomeration of Minnesota taconites and fine ores. Completion by the end of this year is expected.

Part of $20 Million Program—This plant will be a part of a $17 million to $20 million program to obtain basic information before building of permanent commercial taconite plants. The plant will experiment with only two methods, nodulizing and sintering, in an effort to select a means for agglomerating taconite.

Agglomeration is one of the most difficult steps in the taconite program because the product must retain its properties under all kinds of weather, must be strong to withstand severe handling on the way to furnaces, and must have desirable physical properties for economical operation of furnaces.

Capacity To Be Million Tons—The new plant will have capacity to produce approximately 1 million tons of sinter and nodules a year. Of the three main buildings the largest, which will house the sintering machine and raw material section, will be five stories high, 400 feet long and 60 feet wide.

During the breaking-in period, and until taconites are available from Oliver's first pilot plant, fine ores and concentrates from many of the company's washing plants and open pit mines will be hauled by rail to the Virginia agglomerating plant. Agglomeration of fine particles too small to be worked properly in the furnace will be done at Virginia instead of at lower lake furnaces.

J&L To Build Open Hearths

JONES & Laughlin Steel Corp. gave contracts for 15,000 tons of structural steel to American Bridge Co. for its new Southside open-hearth shop which will consist of six 250-ton units, and viaduct over Carson street, Pittsburgh.

Three bar mills at the Southside plant will be dismantled to make room for the open-hearth shop. J & L's output of bars will not be diminished by this action for another unit that has been idle for nine months will be brought into service. The company's finished steel capacity has been far in excess of ingot capacity. The new open-hearth shop will help offset this situation.

Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

The House Judiciary Committee blames the confusion over the freight absorption issue squarely on Supreme Court Justice Hugo L. Black whom it accuses of weasel language

FRAYED TEMPERS were brought to a white-hot heat during the debate that sent back to conference Joseph C. O'Mahoney's bill recognizing the right of sellers to absorb freight in order to compete freely.

Members of the House Judiciary Committee blamed the confusion over the freight absorption issue squareon Supreme Court Justice Hugo L. Black.

The committee tacitly served notice that it didn't want any more obiter dicta (weasel language) from the court.

"This confusion," complained Rep. Emanuel Celler (Dem., N. Y.), committee chairman, "was due to certain obiter dicta indulged in by Mr. Justice Black in the cement case, which obiter dicta was somewhat unrelieved by the so-called 4-4 decision in the rigid steel conduit case. If Mr. Justice Black had simply stated that any individual could either absorb the freight or sell f.o.b. his mill or factory and had not made these extraneous remarks of his, I do not think there would have been any trouble; the erudite excursion indulged in by Mr. Justice Black, caused all the difficulty. The decision itself in the cement case, unrelieved by the observations of Mr. Justice Black, simply states that an individual can absorb freight or sell f.o.b. his plant."

Although House-Senate conferees have agreed on a compromise version of the O'Mahoney bill (S. 1008), the House group, which would take the initial action, will not call up the conference report much before Mar. 13.

On that date the Supreme Court may announce its decision in the Standard Oil Co. of Indiana case which calls for a ruling on whether a seller is entitled to quote different prices to different customers when such divergent prices are quoted to meet competition.

Both House and Senate backers of the O'Mahoney bill say that if the Supreme Court settles the issue affirmatively there will be no need for legislation.

The compromise version defers to recommendations of both the attorney general and Acting Chairman Lowell Mason of the Federal Trade Commission.

Specifically, it provides that re-

By 1955 It May Really Cost You—About $433 Each

IF CONGRESS approves the 15 new spending programs asked by the President, it's going to cost you.

The annual tax burden, now $267 for every man, woman and child in the U. S., would be $433 by 1955.

Added to present state, county and municipal taxes, it would take 40 cents out of every dollar Americans earn.

Those are the latest estimates made by the Senate Committee on Expenditures in the Executive Departments and submitted by Sen. John L. McLellan (Dem., Ark.), committee chairman. Estimated initial cost of the 15 requested new programs would come to $7 billion in the first year of operation, but would come to $25 billion annually after they were in full operation. That would mean a federal budget of $65 to $70 billion for 1955—if the programs were adopted now.

The estimate does not include potential federal expenditures under the various guaranty and loan programs recommended to the Congress—the 20-year housing program, aggregating $5 billion in loans to be guaranteed through the Federal Housing Administration and Reconstruction Finance Corp., and the federal guarantees of bank deposits through Federal Deposit Insurance Corp.

New Program Legislation Proposed by the President for Fiscal 1951	Estimated initial annual cost of program	Estimated annual cost of program in full operation
National health insurance	$15,000,000	$7,000,000,000
Expansion of social security	250,000,000	6,000,000,000
Industrial safety program	3,000,000	5,000,000
Aid to education	300,000,000	500,000,000
National Science Foundation	15,000,000	100,000,000
National Commission against Discrimination in Employment (FEPC)	600,000	5,000,000
Special assistance for rental and cooperative housing	10,000,000	50,000,000
Labor Extension Service	3,000,000	27,000,000
Universal military training	600,000,000	3,000,000,000
Housing and public works	600,000,000	1,400,000,000
St. Lawrence seaway:		
Operating costs	8,000,000	30,000,000
Construction costs	100,000,000	100,000,000
Technical assistance to economically underdeveloped areas (point 4 program)	35,000,000	500,000,000
Farm parity program (Brannan plan)	5,000,000,000	6,000,000,000
Commercial production of natural resources	11,000,000	400,000,000
Incentive payments for development of minerals	70,000,000	70,000,000
Total	7,020,600,000	25,187,000,000

straints of competition may be proven by evidence of "reasonable probability of the specified effect."

Seaway Project To Be Heard

THE GOVERNMENT'S long-awaited iron ore show will be staged when the House Public Works Committee goes into its hearings on the St. Lawrence seaway project, Apr. 24.

Administration spokesmen will declare that the expected iron ore shortage already is here—that currently available ore is not sufficient to maintain 100 per cent continuous operation of the existing 99.4 million net tons of ingot capacity. They will present a balance sheet to show that without the seaway the iron and steel industry has reached its maximum development in the U. S.

The administration will seek to prove that if we are to have continued expansion to meet our growing normal peacetime needs and if we are to be prepared for maximum iron and steel production in time of war, we must have: 1. A far more intensive development in the concentration of taconite and other domestic ores now not being utilized on a substantial scale. 2. A large movement of foreign ore to Great Lakes ports for distribution to the consuming plants served by those ports.

Main point of the argument will be that early completion of the seaway is necessary to permit Great Lakes importation of ore from various foreign sources in time of peace, and from the Labrador-Quebec deposits in time of war. Subsidiary factors will also be covered. One: The need for a larger fleet of ore carriers on the Great Lakes.

Collaborating in the preparation of the presentation are the Commerce Department, Interior Department, the National Security Resources Board, the Munitions Board and the Maritime Commission.

You Can Tie This: Lettuce

WIRE TIES gave outstanding performance in the latest tests to discover improved packaging methods for getting lettuce to market with a minimum spoilage. Of wire-reinforced lettuce-filled wood crates shipped from Salinas, Calif., to New York city, 6.2 per cent were damaged by breakage compared with 11.5 per cent breakage when the crates were not so protected.

Reinforcement consisted of a single strand of 15½-gage wire around the middle of the crate at the bulge, using a wire-tying machine specially developed for this work. Cost of the tieing operation, including price of the wire, ran between 1½ and 2 cents per crate. The new method, it is expected, will reduce loss from package failures from $700,000 down to $350,000 a year. The tests were conducted by the Western Growers Association under supervision of the Marketing and Facilities Research Branch, Production and Marketing Administration, United States Department of Agriculture.

One on the House

STEEL PRICE hearings of the House Judiciary Committee, recently set for March 15, 16 and 17, have been postponed to a date to be announced later—probably in the third week of April.

Chairman Emanuel Celler (Dem., N. Y.) ordered the staff to prepare a thoroughgoing study to guide the committee in questioning the steel spokesmen why steel prices were advanced recently. On the basis of present plans, only representatives of the United States Steel Corp. will be called.

"River, Harbor Projects Needed"

IN A HUFF because of the failure of President Truman to "request a single new project for either river or harbor construction" in his budget for fiscal 1951, the National Rivers & Harbors Congress starts its annual meeting March 23-25.

NRHC usually calls the tune for congressional appropriations for flood control and navigation projects. Pointing to the President's failure to request even one project, Sen. John L. McLellan (Dem., Ark.), president of the organization, says: "If this policy is continued for another two years, the whole rivers and harbors program will be at a standstill, with complete collapse imminent.

"There now is a definite, fully developed need for flood control and navigation projects to cost at least $50 billion over the next 20 years."

Coke, Coal Chemicals, Chromium

ADVANCE PRINTS of chapters from the "Bureau of Mines Minerals Yearbook for 1948" are becoming available from the Superintendent of Documents, Government Printing Office, Washington 25. Preprints of the chapter on Coke and Coal Chemicals are available at 20 cents, and those of the chapter on Chromium at 5 cents.

**********CAPITAL COMPASS**********

S. 75, passed by the Senate Feb. 21, authorizes construction of a dam and incidental works in the main stream of the Colorado river at Bridge Canyon, Ariz.; the program is known as the "Central Arizona Project." House action is needed. . . .

Look for an aggressive campaign to aid Marshall Plan countries to improve their dollar position by increasing their exports to the United States. It will be in charge of Ralph I. Strauss, R. H. Macy & Co. Inc., New York, appointed special assistant to W. Averill Harriman, ECA's special representative in Europe for this purpose . . .

First estimates of coking coal reserves based on actual measurements will begin to come out soon from the Bureau of Mines. They will show mineable reserves, and maps will show their definite locations. Initial reports, to be issued in about two months, will cover Indiana, Cambria and Armstrong counties in Pennsylvania. Later reports will cover the entire Appalachian coal field . . .

Latest move in the administration's antipollution campaign is creation of a new unit in the Public Health Service to supervise the publication of comprehensive reports of water pollution conditions in this country. It is the Reports Analysis and Statistics Branch, Division of Water Pollution Control, and its chief is Perry R. Taylor . . .

Don't forget! If you do not get adequate advance information giving you a chance to bid on government requirements in your line, the man to whom to write is F. G. Moyer, Federal Supply Inquiry Office, Room 7282, Seventh and D streets, S. W. Washington 25 . . .

Following CIO charges that Reconstruction Finance Corp., in its foreclosure action against Lustron Corp., "is out to kill the prefabricated housing industry," the Senate Banking and Currency Committee called on RFC for an airing of its plans with respect to Lustron. Lustron owes RFC $37.5 million on loans. Lustron dealers, headed by W. W. Lobdell, Rockford, Ill., asked the committee to prevent the RFC officials from pulling "the rug out from under us at this time."

European Labor Union Activity Rises

Wage freeze in Britain periled as pressure mounts for pay boosts. French strikes caused by political and economic factors. German labor wants steel socialized

LABOR unions in Western Europe are talking louder.

The discontent is more vocal in Britain because, paradoxically, the Labor party just barely squeaked into office. The powerful Trades Union Congress, a confederation of 187 unions representing more than 8 million British workers, is being pressured to abandon support of the temporary wage freeze it reluctantly accepted in January. With a strong Labor government in power, TUC might hesitate to reverse its stand because such action would be politically unwise. With a near 50-50 split in Parliament and strong pressure for higher wages, TUC may be tempted to risk the wrath of the Labor party.

Sporadic labor disorders in France are caused both by politics and economics. Communists are up to their old political tricks. Many non-Communists are striking for age-old economic reasons.

Konrad Adenauer's West German coalition government is shaky. It may have to woo more labor support to keep in power as rising unemployment and Allied High Commission criticism weaken its position.

Of the four major industrial nations in Western Europe—Britain, France, West Germany and Belgium-Luxemburg—Belux is having the least trouble with unions because it's having a lot of trouble with the economy. Industrial unemployment is up. As in the U. S., Belux strikes usually decrease in times of recession.

U. K. Wage Freeze Thawing?

Is the temporary wage freeze in Britain thawing? The wage policy, agreed upon by government and most unions in January, is contingent on the government's promise to keep the cost of living stable. It provides that no pay increases should be granted unless living costs rise five points from their present level. A rise of about two or three points before September is the current prospect.

In spite of this agreement, TUC is wavering and 4 million workers have made demands for wage increases, including members of the National Union of Railwaymen. Many unionists might be relieved if a strong Conservative party were in power for then they could strike with a clear conscience.

The first test of the Labor government's postelection economic policy will come in April when Sir Stafford Cripps introduces his 1951 budget. He will be unlikely to introduce any spectacular or controversial measures which might upset the political balance in Parliament. Clue to Labor's path for the next few months was given in the innocuous Labor government legislative program set out by King George VI at the formal open ing of the new Parliament Mar. The speech avoided any reference t nationalization.

Exports of iron and steel product from the United Kingdom were at record level in January. Exports o automobiles are also good; in Jan uary 30,747 private cars and chassi and 10,267 commercial vehicles an chassis were shipped abroad.

The Dollar Exports Board in Brit ain has published the first of thre booklets on the marketing of Britis goods in the U. S. and Canada. I deals primarily with distributio problems. The second booklet will b "Dollar Sales—Advertising and Sale Promotion."

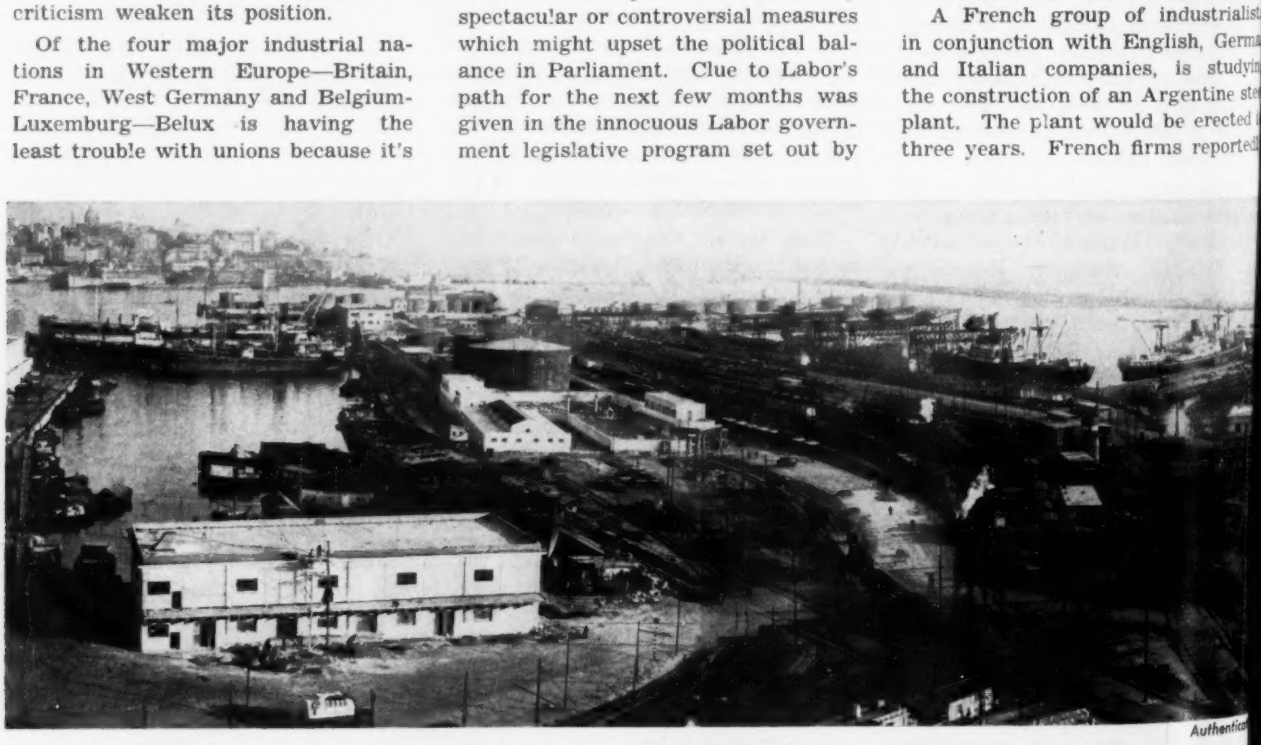
French Want $8.50 More

Wage demands in most of th French strikes held thus far this yea call for an $8.50 monthly bonus re roactive to Dec. 1.

The union leaders can make wag demands now because the Nation Assembly just passed a law legali ing collective bargaining for the firs time since the war.

Purely political strikes have bee and will be met with force. Furth strikes by the Communists are ex pected. Anticipating them, the Frenc cabinet says it will apply a 1939 la protecting the manufacture an transportation of Government arm Penalties under these statutes rang from ten years' hard labor to death

A French group of industrialist in conjunction with English, Germa and Italian companies, is studyin the construction of an Argentine ste plant. The plant would be erected i three years. French firms reported



Authentica

GENOA PANORAMA: Situated on the Gulf of Genoa, this port is a principal mainstay in the economy of Italy. By the opening of St. Gotthard tunnel in 1882, the economic scope of the Port of Genoa was increased to include Swtzerland and Germany, and it has become the most important po in the western Mediterranean. With American aid the po will again be a focal point for trade with Italy and Europ The harbor has a depth of 30 feet

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will get contracts worth $40 million.

Production of steel and pig iron in France slipped slightly in January from December. January ingot output totaled 848,100 net tons; pig iron production was 757,900 tons.

Counterpart funds equivalent to about $57 million have just been released for French coal mines, power projects and loans to private industry. The equivalent of $16 million will be used to modernize coal mines and boost production in such related industries as thermal electric power plants and coke ovens. Nearly $6 million will be loaned to private industry.

Ruhr Steel Issue Up Again

The issue of public or private ownership of the Ruhr steel industry is bobbing up again. The shaky Adenauer government may be forced to make concessions to labor on this issue to stay in power. A compromise may be a semipublic ownership plan whereby unions will have some representation in management.

The issue is alive again because the high commissioners have announced that reorganization of the steel and coal industries will be handled by the Allies with a new Law 75, superseding the present Law 75. Long delay in implementing the old Law 75 prompted some private steel companies to offer their own reorganization plans. This Allied action squelches private schemes. Main difference between the new and old law will be formal inclusion of the French who can now have an official voice in the reorganization. Issue of ownership can still be decided by the West German Bund, as permitted by the first Law 75.

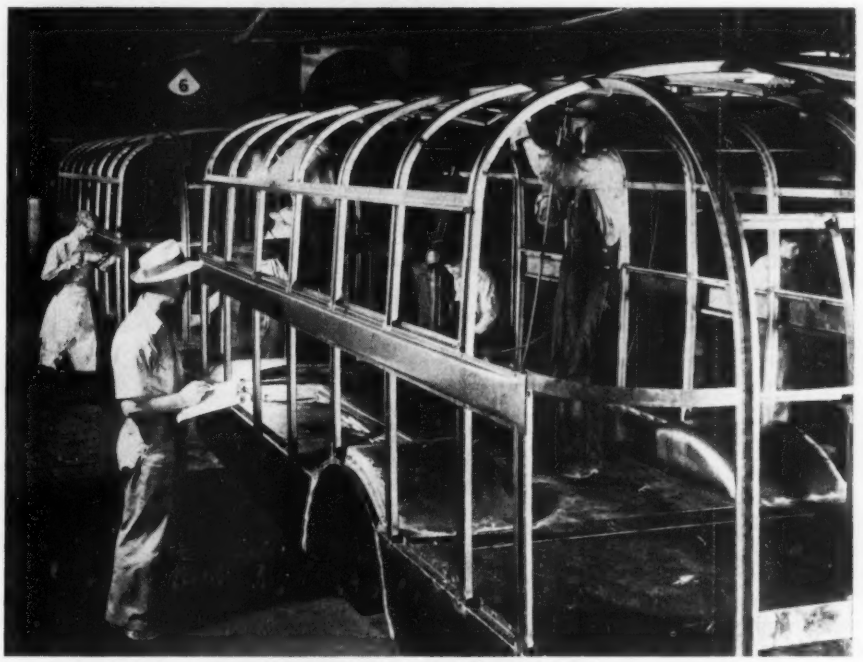
The 11 German steel custodians, working under the old law, have just about finished their preparatory work for steel's reorganization. Most of their plan probably will be accepted by the Allies. It calls for reorganization of steel into eight or eleven vertically integrated companies, each having facilities extending from ore extraction to rolling mills and each having a capacity of about 1 million tons of steel ingots annually.

The steel companies are all going at top speed now. Most have two to three month order backlogs despite export competition that is getting stronger every day. French producers are offering steel bars at $50 per metric ton. The best German price is $55, but Ruhr steelmakers still have one trump card—short delivery periods.

German machinery manufacturers, who before the war exported 30 per cent of their total volume, now ship only 10 per cent abroad. Railway equipment makers are doing well on the foreign market. One export order from Turkey calls for 130 freight cars, six cranes and track material.

Volkswagon automobile sales are also mounting, particularly in the Near East.

Blacksmith Shop to Bus Body Plant



WHEN Dave Ward started building bus bodies, he could carry his tools in one hand and his money in the other. He made his first bus in 1936 in a small blacksmith shop on one of the dusty roads leading into Conway, Ark. Today he is president of Ward Body Works Inc.

His employees have increased from three to more than 170. His plant area has grown from 800 sq ft to 85,000 sq ft.

Mr. Ward is a production-conscious man with ingenuity. Right now his engineering and machine shop personnel are at work on a contour forming machine that can form body bows, door frames, curved guard rails, bumpers and hundreds of complex curved items. The machine will form steel in several planes—with continuous curvature or reverse bends.

Ward goes a long way—literally—to get his production job done: The spur gear, 8 feet in diameter, for the contour machine was located in a silicon mine in the Ozarks; for a table axle, a main shock strut from a B-29, procured in Wichita, Kans., was fitted with a large thrust bearing and then anchored to the main structure of the machine.

Earlier this year, Ward installed a Yoder roll forming mill by which the company was able to cut out 28 separate operations formerly done on shears and press brakes.

A few years ago Mr. Ward bought a 400-ton triple-action Hydro-Press from War Assets Administration. By the use of new dies, made in his own shop, his press section was able to turn out doors, windows, corners and other items in quantity lots.

In 1940 Ward began to buy steel in large quantities. It was shipped down the Ohio and Mississippi rivers from Jones & Laughlin Steel Corp., which today supplies him with 85 per cent of his steel needs.

Last spring Ward needed a bake oven to finish completed bodies with a higher gloss. It was necessary to speed the movement of completed bodies to the interior finishing plant. Mr. Ward told the builders "to get a fire under the job." In 27 days the oven was ready for operation.

Dual Movement Clock Introduced

ADVANCED TimeKeeper Inc. is marketing an electric clock with a dual movement which insures the correct time regardless of current interruptions.

When interruptions do occur—even though for only one second—spring power immediately takes over the job until current is resumed. The spring movement needs rewinding less than once a year. A vertical slot is used to indicate when it is necessary to rewind. Advanced TimeKeeper is located in Newark, N. J.

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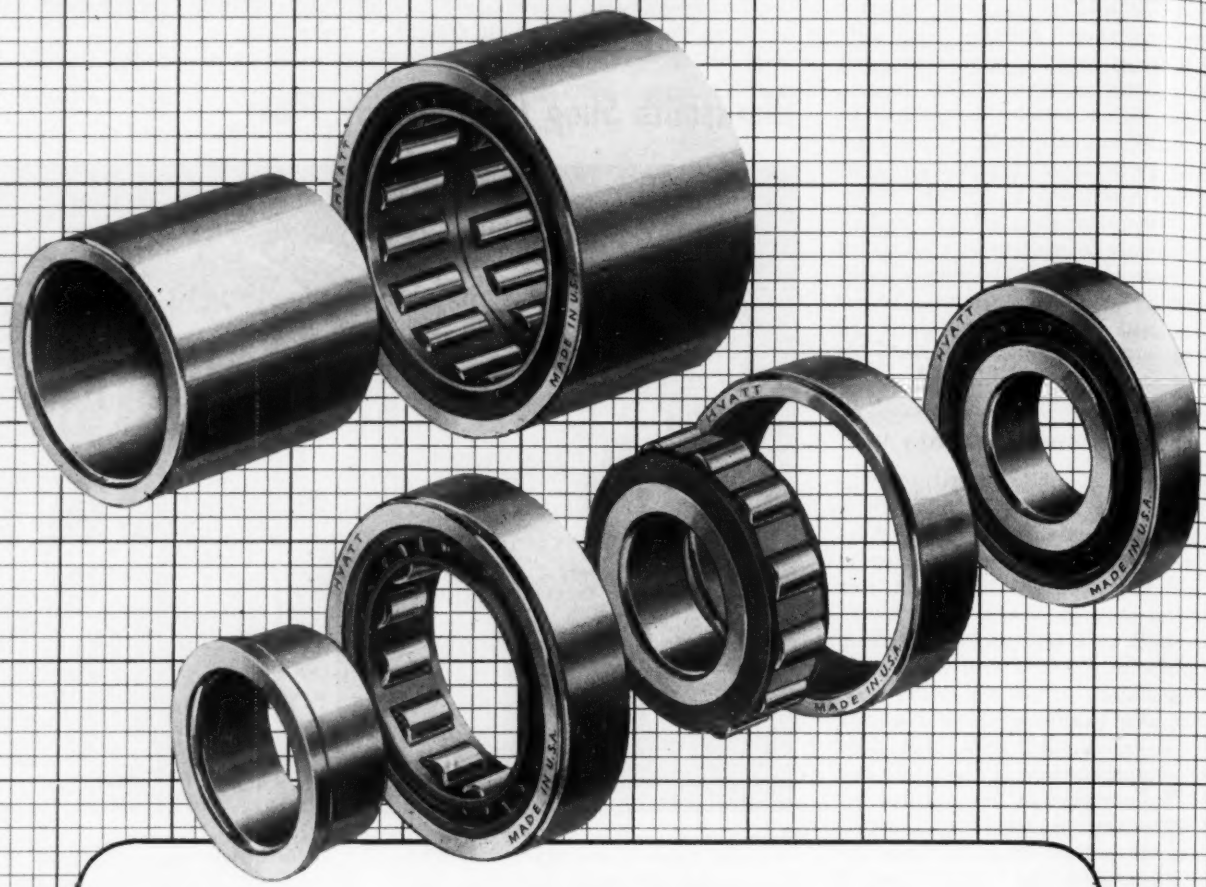

Take Advantage of HYATT Experience

Hyatt Hy-Load bearings are high capacity cylindrical roller bearings. They are available in two diameter series, wide and narrow widths and standard AFBMA boundary dimensions.

There are ten major types; four with separable inner races, two with separable outer races and four which are non-separable.

This wide range of available sizes and types, plus complete interchangeability of parts permits wide flexibility of machine design and assembly procedures.

Over the years, more and more design engineers have come to rely upon Hyatt for completely dependable bearing engineering. If bearings are part of the machine you are designing reach for your Hyatt catalog or make use of the Hyatt Engineering Service. For further information write to Hyatt Bearings Division, General Motors Corporation, Harrison, N. J., Chicago, Detroit, Pittsburgh and Oakland, Calif.

HYATT ROLLER BEARINGS

By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Automakers cancel cutbacks as coal strike ends. Approach of spring selling season may perk up schedules. Chrysler stoppage expected to end soon

DETROIT

SETTLEMENT of the coal dispute was reflected immediately in a brighter automotive outlook. Pressure on assembly schedules was relieved and production of cars and trucks is slated to move ahead, with both Ford and General Motors taking off all the brakes that were being applied in recent weeks. Saturday operations will not be resumed by GM for the present, pending a more complete check of the supply situation. However, as the spring selling season approaches, expectations are for accelerated demand for dealers, most of whose stocks are considered by factories to be below what the current market pace would justify.

Chrysler Settlement Near

THERE is a feeling the wind-up of the long Chrysler strike may not be long in coming now that the coal trouble is out of the way. As long as the mines were tied up, the auto negotiations just stalled along, with neither side making much of an effort to reach an agreement. The UAW staged a mass meeting last Tuesday for a review of the strike issues before Chrysler workers. This is a standard technique in a large strike and usually comes about the time a settlement is near. Company officials were invited to address the meeting, but naturally declined on the grounds that the place to iron out the dispute was around the bargaining table and not at a mass meeting which usually takes on many of the aspects of a circus.

Sales Set Record

FIRST copies of the twenty-fifth annual financial report of Chrysler Corp. were run off on a ditto machine instead of the usual letter-press. The reason certainly could not have been for economy, as the corporation's sales, both in dollars and in units, set a new alltime record last year. United States plants turned out 1,267,470 passenger cars and trucks, while Canadian plants added another 63,468. Total sales of vehicles and other parts and equipment amounted to $1,084,602,547, bringing net earnings of over $132 million after taxes. Net earning rate on sales was 6.34 per cent, which has been exceeded in eight previous years of Chrysler history. Foreign subsidiary dividends contributed over $13 million to earnings.

Figuring 250 working days to the year, net earnings average out to $528,700 per day. As of the end of last week, the company had lost 33 days of production which would mean, on the basis of last year's record, an earnings loss of close to $17.5 million.

Where Dollar Goes—The Chrysler income dollar breaks down as follows: Materials, supplies and services, 0.63c, wages and salaries 0.166c, buildings, machinery, equipment and tools, 0.033c, federal, state and local taxes, 0.102c, dividends 0.022c, retained in business 0.041c. Other statistical data, released for the first time in the annual report and covering the corporation and its wholly-owned U. S. subsidiaries are: Employees 107,084, stockholders 66,582, suppliers 6500, dealers 10,574, square feet of plant floor space 24,300,000, number of machine tools 23,276, Chrysler-built vehicles registered in the United States, 8,987,049.

Use 1,300,000 Tons of Steel—Use of materials last year covered 1,300,000 tons of steel, 254,000 tons of iron, 20,000 tons of copper, 19,000 tons of lead, 900 tons of tin, 5000 tons of aluminum, 6000 tons of zinc, 143,000 tons of rubber, 30 million square feet of glass, 6,330,000 gallons of paint, 1300 tons of plastics, 35,000 tons of sound-deadening materials, 44,000 miles of wire and 19.5 million yards of interior trim.

Auto, Truck Output

U. S. and Canada

	1950	1949
January	616,642*	445,092
February	508,000*	443,734
March		543,711
April		569,728
May		508,101
June		623,689
July		604,351
August		678,092
September		657,073
October		601,021
November		474,731
December		384,318
Total		6,533,641

Weekly Estimates

Week Ended	1950	1949
Feb. 18	123,712	114,207
Feb. 25	125,285	118,815
March 4	127,012	118,267
March 11	130,000	114,223

Estimates by Ward's Automotive Reports

* Preliminary.

"Hard Top" Demand Good

DEMAND for "hard top" convertible-type models is particularly strong in the GM group, both Chevrolet and Pontiac claiming to be unable to come close to filling order banks for this design. Ford does not build a "hard top," the only other makes being in the Chrysler line and Kaiser-Frazer, neither of which has been able to turn out many of them as yet.

It would seem to be a good bet that other manufacturers of convertibles could tool up to build hard-tops without too much delay, since they are nothing more than a convertible chassis with a specially-designed steel roof panel welded in place. Actually some of the underbracing of the chassis can be removed because of the added strength realized from the rigid roof.

The five GM hard-tops are the Cadillac Coupe de Ville, the Oldsmobile Holiday Coupe, the Buick Riviera, the Pontiac Catalina, and the Chevrolet Bel Air. Bodies for the Cadillac-Olds-Buick group are practically identical, as are the Pontiac and Chevrolet designs. There were some misgivings voiced when the models first went into production, some engineers feeling that minimum of side support provided to the roof panel might result in twisting which would break the broad sweep of curved glass in the rear window. However, there have been no field reports of failures on this score.

GM Output 53% of Total

FINAL tabulation of General Motors February production showed 267,547 passenger cars and trucks, which was roughly 53 per cent of the total for the entire industry. It was only 8300 units short of the January

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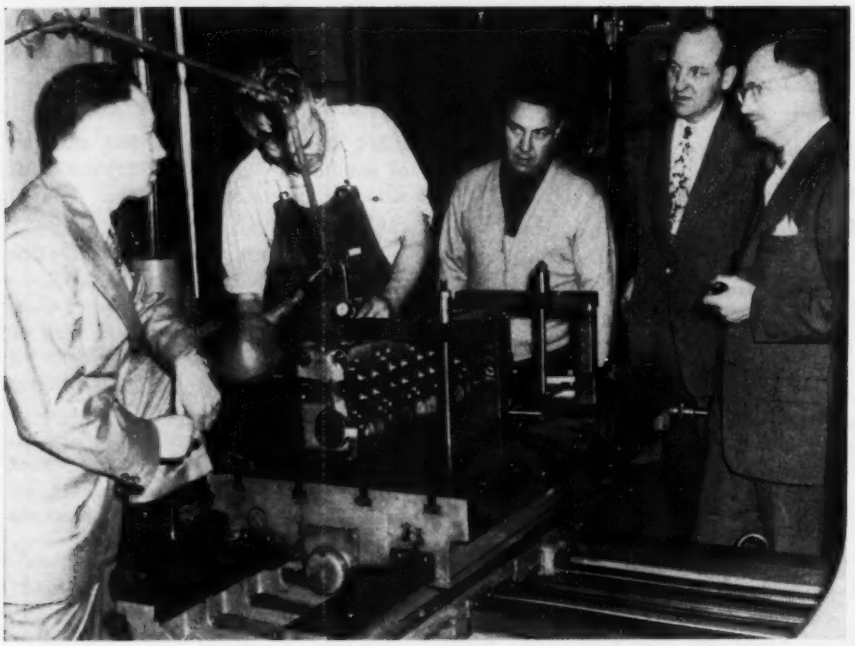


PERFECTION IN PRECISION: That's the subject of the five-man conference here. Jimmy Jackson (center), who will drive the Cummins Diesel Special in the Indianapolis Speetway Race May 30, visited the Cummins Engine Co., Columbus, Ind., to confer with Cummins engineers on engine construction. After an absence of 16 years Cummins is again entering a diesel-powered car. With Mr. Jackson are D. J. Cummins, vice president of engineering; N. M. Reiners, engineer directly in charge of the engine project; and J. C. Miller, in charge of Cummins' laboratory program

figure, although 75,000 beyond the same month a year ago. The high proportion of total industry output realized by GM was of course due principally to the Chrysler shutdown. The Chevrolet Division alone accounted for 141,935 or 53 per cent of the corporation total.

Buick sales for the month were 10 per cent ahead of January, despite the shorter month. Deliveries aggregated 38,410, largest for any February in the division's history. Production was 36,064, indicating sales were continuing ahead of shipments to dealers. In the final ten days of the month reports indicated retail sales were 47 per cent over the same period a year ago. Meanwhile, output of Dynaflow transmission units has passed the 400,000-mark. Present capacity for building this equipment is three times what it was when it was introduced in 1948, and production facilities are being expanded again.

The Detroit transmission division of GM reportedly is working on a combination of the Dynaflow and Hydra-matic transmission principles in a new design which probably will be offered first on Cadillac. The idea is to provide initial torque conversion and then a means for locking out the torque converter when at cruising speed. Some observers saw in General Motors' offer of the Hydra-matic transmission to Lincoln, Nash and Kaiser-Frazer an indication that the new type of transmission was close to the production stage. However, it did not materialize on the 1950 models so prospects now point to a delay until the 1951 lines are announced.

Nash Readies Toronto Plant

THE FIRST Canadian-built Nash passenger cars will soon be rolling from the company's new plant in Toronto, as final touches are being placed on interior plant details. About 300 will be employed there, and all possible production machinery is being purchased in the dominion. A large replacement parts warehouse also is being erected on the plant site.

Ford Sets Up Foundation

ANNOUNCEMENT has been made of the formation, under Michigan charter, of the Ford Motor Co. fund, a charitable, nonprofit corporation for the "alleviation of want and human suffering and the betterment and improvement of mankind through the making of contributions to organizations operating exclusively for charitable, scientific, literary or educational purposes." In describing the project, Henry Ford II noted that traditional sources of financial support of private institutions operating in these fields are tending to disappear and he does not like the consequences inherent in the alternative facing such private institutions—turning to the government for financial aid. He feels the situation calls for increasing responsibility from American business. Eight members of the Ford's board of trustees are: Mr. Ford, E. R. Breech, L. D. Crusoe, John R. Davis, Benson Ford, William T. Gossett, D. S. Harder and T. O. Yntema. Headquarters are in Dearborn.

Ford Turnover Drops

AVERAGE monthly labor turnover among Ford employees dropped from 3.7 per cent in 1948 to an even 3 per cent last year. This rate is considerably less than the monthly Bureau of Labor Statistics average of 5.8 per cent for the automobile industry, and 4.2 per cent for all manufacturing industries. An even better record was shown in a turnover rate of only 2.9 per cent for employees in Michigan plants alone. The latter figure compares with 8 per cent for the entire Michigan auto industry.

Army Sponsors New Differential

AUTO engineers perked up their ears at a Des Moines, Iowa, speech by the assistant secretary of the Army in which he revealed the ordnance department was sponsoring the development of a new-type differential which prevents one wheel from spinning while the other stands still, the idea being to facilitate vehicle operation in mud or snow.

'Hot Rods' for Police

DETROIT police have been testing a "souped-up" Ford, capable of 115 mph, to be built for law enforcement agencies only. It is proposed to replace half the force's fleet of scout cars with the new "blue coat hot rod."

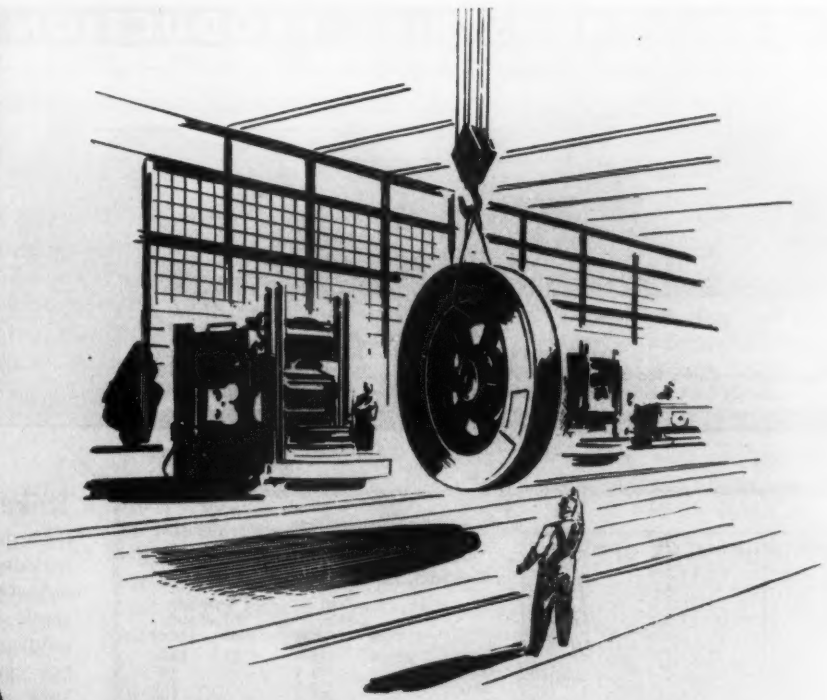
'Tilt-Type' Trailers for Buildings

A "TILT TYPE" trailer with a low platform for greater overhead clearance is being made by Martin Machine Co., Kewanee, Ill., manufacturer of the Carryhaul trailer line for the heavy construction industry.

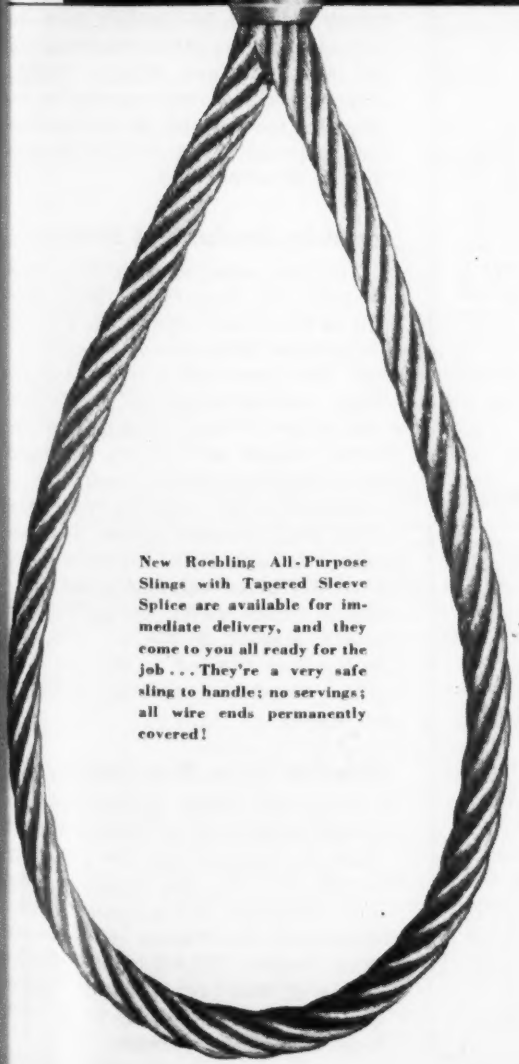
The new Martin Model 333 Carryhaul is built 16 inches from ground to platform, offering greater clearance for low viaducts, etc. The model is an extremely low-slung version of the Model 222 Tilting Platform trailer that has a higher platform height.

Features of the trailers are a low center of gravity and a low angle of decline. As with all Martin Carryhaul tilt-type trailers, the rear end of the platform of the Model 333 lowers to the ground for fast loading and unloading—a one-man operation.

UNIVERSITY OF MICHIGAN LIBRARIES



THIS SPLICE IS NEWS!



New Roebling All-Purpose Slings with Tapered Sleeve Splice are available for immediate delivery, and they come to you all ready for the job . . . They're a very safe sling to handle; no servings; all wire ends permanently covered!

New Roebling All-Purpose Sling with the Tapered Sleeve Splice

YOU GET NEW SAFETY at less cost with this unique splice. It's cheaper than ordinary tucked splices . . . saves the expense of "splicing your own." This remarkably simple rolled loop and tapered sleeve attachment develop the *full catalog strength* of the new Roebling All-Purpose Sling.

New Roebling All-Purpose Slings with the Tapered Sleeve Splice are made of Preformed "Blue Center" Steel Wire Rope with Independent Wire Rope Core. Their rolled loops are made by passing three strands and the core around the loop in one direction, and the other three strands in the opposite direction. Ends of all wires are permanently anchored in the compact, tapered sleeve.

Roebling All-Purpose Slings are the last word in toughness and dependability . . . offer full flexibility and handling ease. They are available in all standard lengths and sizes. Write for fully descriptive folder . . . and for the "Sling Data Book." In the full Roebling line there's a safe sling for top performance and dollar savings on every lifting job. ***THAT'S WHY***

Today it's Roebling!

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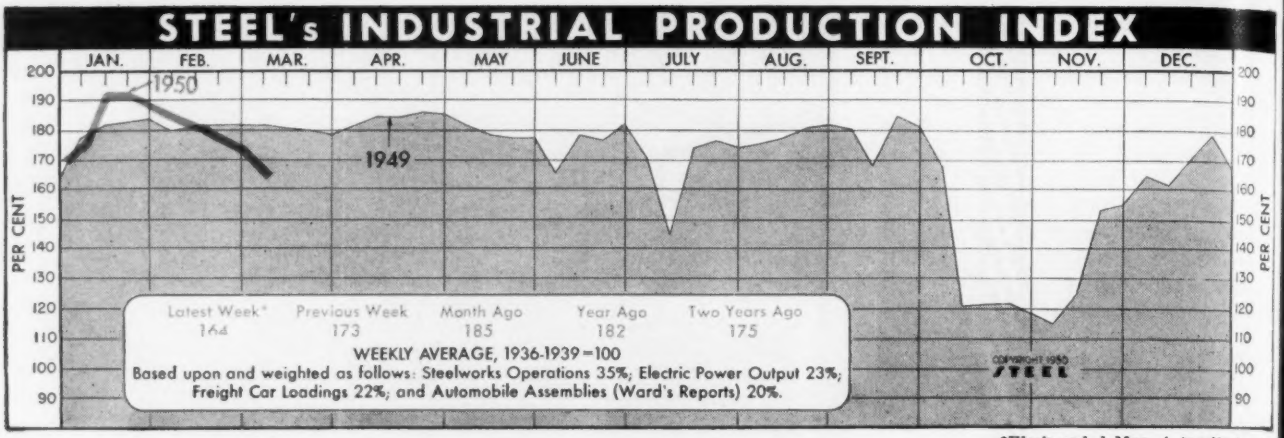
STEEL's INDUSTRIAL PRODUCTION INDEX
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
1950
1949
PER CENT
Latest Week* 164
Previous Week 173
Month Ago 185
Year Ago 182
Two Years Ago 175
WEEKLY AVERAGE, 1936-1939=100
Based upon and weighted as follows: Steelworks Operations 35%; Electric Power Output 23%; Freight Car Loadings 22%; and Automobile Assemblies (Ward's Reports) 20%.
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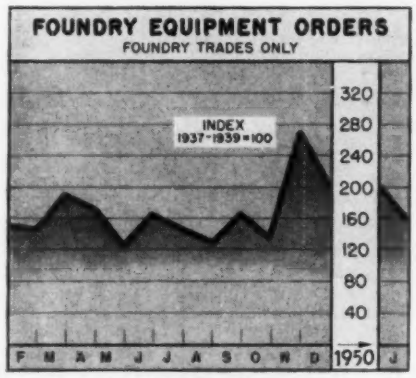
*Week ended Mar. 4 (preliminary)

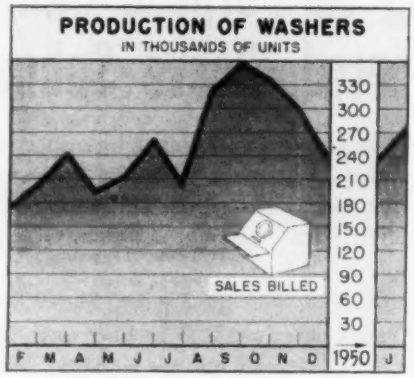


Charts—Copyright 1950, STEEL.

Foundry Equipment Orders

	Index		Value in Thousands	
	1950	1949	1950	1949
Jan.	159.3	149.9	$731	$694
Feb.	....	144.4	....	668
Mar.	....	190.8	....	883
Apr.	....	172.0	....	797
May	....	121.9	....	565
June	....	164.9	....	764
July	....	146.6	....	679
Aug.	....	127.1	....	589
Sept.	....	166.6	....	772
Oct.	....	133.5	....	618
Nov.	....	270.4	....	1,250
Dec.	....	201.0	....	929

Foundry Equipment Mfrs. Assoc.

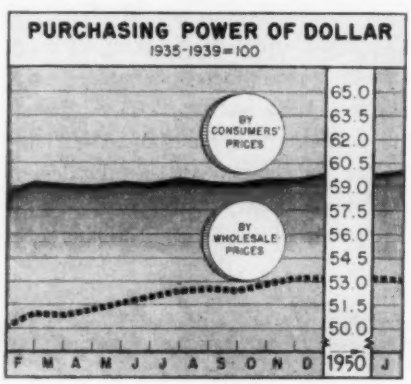


Household Washers

Sales Billed—Units

	1950	1949	1948
Jan.	275,576	172,400	360,445
Feb.	.....	201,300	367,909
Mar.	.....	242,500	408,512
Apr.	.....	192,500	402,257
May	.....	211,700	377,895
June	.....	260,700	392,496
July	.....	200,900	326,181
Aug.	.....	323,789	362,169
Sept.	.....	357,281	433,919
Oct.	.....	333,728	382,400
Nov.	.....	298,717	319,300
Dec.	.....	237,591	183,700
Totals	.....	3,033,106	4,317,183

American Washer & Ironer Mfrs. Assoc.



Purchasing Power of the Dollar

As Measured By:

	Wholesale Prices		Consumers' Prices	
	1950	1949	1950	1949
Jan.	53.1	50.1	59.9	58.5
Feb.	...	50.9	...	59.2
Mar.	...	50.8	...	59.0
Apr.	...	51.2	...	58.9
May	...	51.6	...	59.1
June	...	52.0	...	59.0
July	...	52.4	...	59.3
Aug.	...	52.6	...	59.2
Sept.	...	52.4	...	59.0
Oct.	...	52.8	...	59.3
Nov.	...	53.2	...	59.3
Dec.	...	53.2	...	59.7

U. S. Office of Business Economics

Issue Dates of Other FACTS and FIGURES Published by STEEL:

Building Const. Feb.27	Gray Iron Cast....Mar.6	Refrigerators Mar.6
Employ., Metalwkg..Jan.2	Ironers, Standard...Jan.2	Steel Castings Feb.27
Employ., Steel Feb.20	Machine Tools Feb.27	Steel Forgings Feb.20
Fab. Struc. Steel..Mar.6	Malleable Castings..Feb.27	Trucks, Elec. Ind...Jan.2
Freight Cars Feb.27	Mfrs. New Orders..Jan.2	Vacuum Cleaners...Feb.27
Furnaces, Indus. ...Jan.2	Radio, Television...Mar.6	Wages, Metalwkg...Jan.2
Furnaces, W. Air...Jan.2	Ranges, Elec. Jan.2	Wholesale, Consumer
Gear Sales Mar.6	Ranges, Gas. Jan.2	Prices Mar.6

Strike Forces Index Drop

Cutbacks in many segments of the metalworking industry forced STEEL's industrial production index for the week ended Mar. 4 to the lowest point since early December. At 164 per cent (preliminary) of the 1936-1939 average it was down 9 points from the figure for the preceding week and 18 points below the corresponding week a year ago.

Almost all the decline was due to the drop in the steelmaking rate which was off 15.5 points from the preceding week. Other components of the index changed slightly. Electric power generated and automotive assemblies made small advances which were nullified by a further decrease in freight carloadings.

Foundry Equipment Slumps

Foundry equipment orders index declined in January to 159.3 from 201 in December, reports the Foundry Equipment Manufacturers Association. The index which is based on average monthly shipments in 1937-1939 represents a dollar volume for the latest month of $730,769, compared with $929,343 a month earlier.

Shipments in January were also down from a month earlier. The January total was $1,244,002 divided into $735,171 in new equipment and $508,831 in repair parts. December shipments totaled $1,297,394 with the proportions shipped in the two categories about the same as in the later month.

Washer Sales Rise Sharply

Factory sales of standard-size household washers in January showed marked increases over the preceding month and the like month a year ago. American Home Laundry Manufacturers' Association says January sales totaled 275,576 units, an increase of 59.8 per cent over 172,400 in January, 1949, and up 16 per cent from 237,591 in December.

The Business Trend

Now that the coal strike is over industry is rolling up its sleeves preparatory to higher production. This week's activity should be nearly normal

INDUSTRY'S sights are set on high level production now that the obstacle of short fuel supplies has been passed. This week's activity should be near normal as transportation, fuel and raw materials become available in increasing volume.

Fuel rationing and conservation measures are at an end. Coal stockpiles are still far below normal but no one is worried because mine production can keep ahead of demand and stocks will soon reach a safe level. All railroad freight runs suspended during the coal shortage are back on schedule.

Only automobile production continues to be hampered. Settlement of the Chrysler strike would remove a major roadblock in the auto industry's drive to reach peak production. The other industry production totals that are used to compute STEEL's industrial production index — electric energy distributed, freight carloadings and the steelmaking rate works operations—are certain to climb in this week and for those immediately following.

Coal . . .

Bituminous coal will flow freely from the mines this week and reach a total near 13 million tons. Last week's output is estimated at about 11 million tons. The latest week for which actual totals are available is for the week ended Feb. 25 and in that week only 2,620,000 tons were mined.

Steel . . .

Steelmaking is recovering rapidly from the cutback enforced by the fuel shortage. This week the output of steel for ingots and castings will be around 90 per cent of capacity after a small recovery last week from the 70 per cent of capacity low reached in the week ended Mar. 4. Recovery is more rapid than after the steel strike because the steel industry did not shut down entirely.

Carloadings . . .

Freight carloadings are up sharply. Coal loadings alone add about 100,000 cars a week to the total for strike affected weeks. Resumption of freight runs suspended by Interstate Commerce Commission orders has added additional cars to the weekly totals.

Automobiles . . .

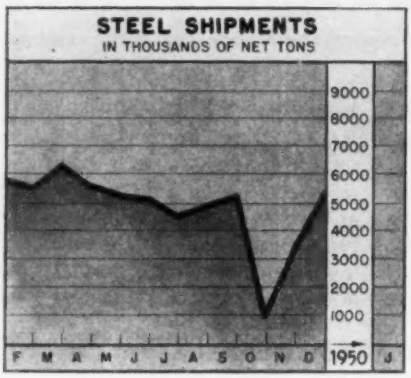
Even without Chrysler assemblies the outturn of the automotive industry in recent weeks has been higher than in the corresponding period a year ago. Assuming Chrysler production at prestrike levels, an additional 35,000 assemblies per week would be added to the industry total, bringing it up to alltime weekly high levels. About 210,000 units have been lost to date, representing about $250 million in sales. In the week ended Mar. 4 the industry assembled 127,012 passenger cars and trucks, compared with 125,285 a week earlier and 118,267 in the like week a year ago.

Manufacturers' Sales . . .

Manufacturers' sales in January were higher than in December and new orders showed their first upturn

BAROMETERS of BUSINESS

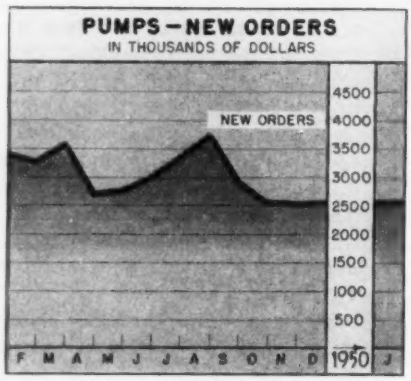
		LATEST PERIOD*	PRIOR WEEK	MONTH AGO	YEAR AGO
INDUSTRY	Steel Ingot Output (per cent of capacity)†	70.0	85.5	94.0	99.5
	Electric Power Distributed (million kilowatt hours)	5,879	5,854	6,062	5,552
	Bituminous Coal Production (daily av.—1000 tons)	437	404	1,250	1,812
	Petroleum Production (daily av.—1000 bbl.)	4,909	5,000	4,945	5,243
	Construction Volume (ENR—Unit $1,000,000)	$133.4	$263.6	$160.7	$118.6
	Automobile and Truck Output (Ward's—number units)	127,012	125,285	127,428	118,267
	*Dates on request. †1950 weekly capacity is 1,906,267 net tons. 1949 weekly capacity was 1,843,516 net tons.				
TRADE	Freight Car Loadings (Unit—1000 cars)	540†	547	613	706
	Business Failures (Dun & Bradstreet, number)	179	210	199	185
	Money in Circulation (in millions of dollars)‡	$27,060	$27,019	$26,928	$27,557
	Department Store Sales (changes from like wk. a yr. ago)‡	−5%	+2%	+2%	−7%
	†Preliminary. ‡Federal Reserve Board.				
FINANCE	Bank Clearings (Dun & Bradstreet—millions)	$14,524	$12,693	$13,266	$13,763
	Federal Gross Debt (billions)	$256.2	$256.5	$256.8	$252.1
	Bond Volume, NYSE (millions)	$19.3	$16.0	$22.0	$14.3
	Stocks Sales, NYSE (thousands of shares)	7,932	6,316	10,109	3,930
	Loans and Investments (billions)†	$67.0	$67.0	$67.8	$62.0
	United States Gov't. Obligations Held (millions)†	$37,162	$36,975	$38,077	$32,814
	†Member banks, Federal Reserve System.				
PRICES	STEEL's Weighted Finished Steel Price Index††	156.13	156.13	156.13	154.85
	STEEL's Nonferrous Metal Composite‡	159.8	159.7	159.9	232.6
	All Commodities†	152.6	152.5	151.2	158.7
	Metals and Metal Products†	169.2	169.4	169.5	175.1
	†Bureau of Labor Statistics Index, 1926=100. ‡1936-1939=100. ††1935-1939=100.				



Steel Shipments
Net Tons

	1949	1948	1947
Jan.	5,788,632	5,410,438	5,061,333
Feb.	5,519,938	5,046,115	4,626,424
Mar.	6,305,681	5,978,551	5,304,415
Apr.	5,596,786	5,096,161	5,445,993
May	5,234,862	5,321,375	5,442,343
June	5,177,259	5,476,774	5,263,711
July	4,534,855	5,229,880	4,974,566
Aug.	4,918,314	5,329,060	5,278,223
Sept.	5,236,196	5,511,474	5,118,839
Oct.	935,037	5,952,008	5,681,597
Nov.	3,296,809	5,732,256	5,216,990
Dec.	5,410,902	6,056,282	5,613,036

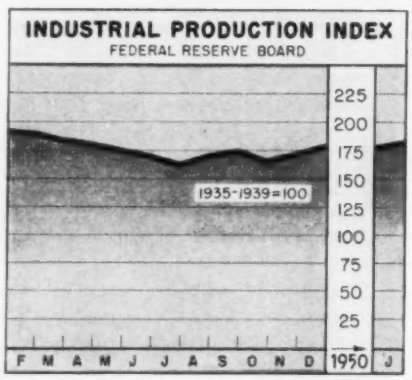
American Iron & Steel Institute



Pumps, New Orders
In Thousands of Dollars

	1950	1949	1948
Jan.	2,586	3,390	3,819
Feb.	....	3,247	3,635
Mar.	....	3,593	4,703
Apr.	....	2,699	4,312
May	....	2,775	3,724
June	....	3,019	3,512
July	....	3,358	4,075
Aug.	....	3,767	4,520
Sept.	....	2,914	3,474
Oct.	....	2,539	3,571
Nov.	....	2,525	3,580
Dec.	....	2,560	4,263
Totals	....	36,386	47,188

Hydraulic Institute



Industrial Production Indexes

	Total Production		Iron, Steel		Non-ferrous	
	1950	1949	1950	1949	1950	1949
Jan.	183	191	204	228	177	184
Feb.	...	189	...	232	...	186
Mar.	...	184	...	233	...	183
Apr.	...	179	...	219	...	168
May	...	174	...	204	...	145
June	...	169	...	177	...	132
July	...	162	...	156	...	128
Aug.	...	170	...	178	...	141
Sept.	...	174	...	179	...	157
Oct.	...	166	...	103	...	164
Nov.	...	173	...	144	...	163
Dec.	...	180	...	198	...	165
Avg.	...	176	...	187	...	160

Federal Reserve Board

Charts—Copyright 1950, STEEL.

since September, says the Commerce Department. Inventory book values were practically unchanged from December. The rise in durable goods after allowance for seasonal factors amounted to 5 per cent. Although greater activity in motor vehicles after the yearend reduction in output was a major factor in the advance, the metals, machinery and building materials groups also increased sales more than seasonally.

Construction . . .

Civil engineering construction volume in the week ended Mar. 2 was $133.4 million, compared with $263.6 million in the preceding week and $118.6 million in the corresponding 1949 week. Cumulative total for the first nine weeks this year is $1735 million, 39 per cent above the corresponding period a year ago. Private construction for the period is $927.7 million and public construction is $807.5 million. These totals represent increases over aggregates for the corresponding period in 1949 of 38 and 40 per cent, respectively.

Petroleum . . .

Bureau of Mines estimates the amount of crude petroleum that will be consumed or exported this month at 5,050,000 barrels. This is a slight decline from the February forecast of 5,120,000 barrels daily. The forecast includes estimates of a total gasoline demand of 79 million barrels this month.

Better Second Quarter

First period production below forecasts due to strikes. Carryovers will boost future output

WHAT are the prospects for the metalworking industries now that the coal strike is settled?

First quarter production will be lower than predicted at the start of the year. The early forecasts were based on the assumption of no industry-wide work stoppages. Curtailment in steelmaking and metalworking forced by the coal strike in February and continuing after the coal settlement Mar. 4 resulted in moderate production losses for the first quarter.

Much of the first quarter loss will be made up in the second quarter which may be somewhat higher than anticipated at the beginning of the year. This again is based on the assumption of no crippling strikes.

Steel Output To Rebound—Steel mill operations should continue at high levels for the next few months as demand remains unsatisfied except in a few items. There has been insufficient time for inventories to be built up to normal levels since the end of the steel strike. This is particularly true in the automotive industry and in appliances where production to date has been very high.

Even in freight car building at least the early part of the second quarter should see some brisk activity. Orders placed since the first of the year will not begin to be filled until that time because of short supplies.

Building Prospects Good — Construction activity this spring will be at high levels and that means business for a variety of metalworking companies. It means good business for steel fabricators, appliance builders, plumbing manufacturers and others.

Machinery manufacturers whose sales and orders to date have been better than many of them expected say the upswing should continue for the next few months, but they say it with their fingers crossed. There will probably be a number of orders closed in the next few weeks that were hanging-fire until the coal strike was settled.

Appliance Prices Cut

Despite a sizable backlog, Westinghouse Electric Corp. announces price reductions of $40 on electric dryer models and $30 on automatic washers. R. J. Sargent, laundry equipment department manager, of the corporation's Appliance Division, says

the move is to keep Westinghouse competitive even though "we can still sell today at our 1949 price levels."

Difficulty in obtaining steel and other basic parts has made it impossible to break the backlog of orders, he explains. New models are being shipped to the field as fast as they come off the line.

Pickup in Truck Parts

An encouraging pickup in shipments to truck manufacturers resulting in the highest rate since the first quarter of 1949 is reported by C. I. Ochs, president, Eaton Mfg. Co., Cleveland. Present indications point to a good year for Eaton in 1950.

In 1949 sales dropped from 1948 levels because of the decline in truck production. Mr. Ochs points out that despite encouraging signs this year costs are increasing due to higher prices paid for steel and other materials. The adoption of a pension program will add further to cost of the company's products.

Sunbeam Sales Top Year Ago

Current business is running at an annual rate of nearly $60 million, compared with slightly more than $50 million in sales in 1949, says B. A. Graham, president, Sunbeam Corp., Chicago. Efficient operations in the company's new plant now that operating bugs have been worked out and new products introduced last year are responsible for the improvement.

Sunbeam makes small electric appliances such as toasters, waffle irons, electric mixers and electric razors. In the electric razor line alone, sales since Christmas are 74 per cent higher than they were in the like period a year ago.

Good Start in Order Volume

Some improvement in new orders since the beginning of the year is reported by H. C. Ramsey, president. Worthington Pump & Machinery Corp., Harrison, N. J. While it is still too early to tell if that favorable trend will continue, he adds, wide diversification of the company's products will be helpful in maintaining a volume consistent with the national level of productive activity.

Steel price increases and the request by unions to negotiate pension and welfare plans makes any anticipation of this year's profit margin difficult, Mr. Ramsey says. Increased costs must in due time be recovered by higher prices, productive efficiencies or both, he adds. It is unlikely that such transition can be attained in time to prevent an adverse effect on this year's profits.

New orders booked by Worthington last year were at a lower rate than in 1948 with a resultant decrease in backlogs but the volume carried over into this year insures satisfactory billings for the first half. Increased efficiencies resulting from additions and improvements made to plant and equipment in the last two years resulted in 1949's net income comparing favorably to the previous year's despite a drop in billings of more than $3 million. Inventory reduction in 1949 totaled $7,866,006 in keeping with the overall industrial trend in this direction.

Manufacturing, Mining Failures on Increase

WHAT keeps your business solvent while others fail? Is it good management? Or are you in a noncompetitive field?

It's probably the first named reason that keeps you in business because competition is firmly established in all metalworking lines and many of the marginal operators have already fallen by the wayside. As always the race will go to the swift and the remainder will join those who have closed their doors since the war's end.

Failures on Increase—Failures in manufacturing and mining have risen steadily since the end of the war Dun & Bradstreet totals show. Since 1945 when an alltime low in failures per 10,000 businesses was set, failures have moved upward both in physical numbers and in relation to the total number of businesses.

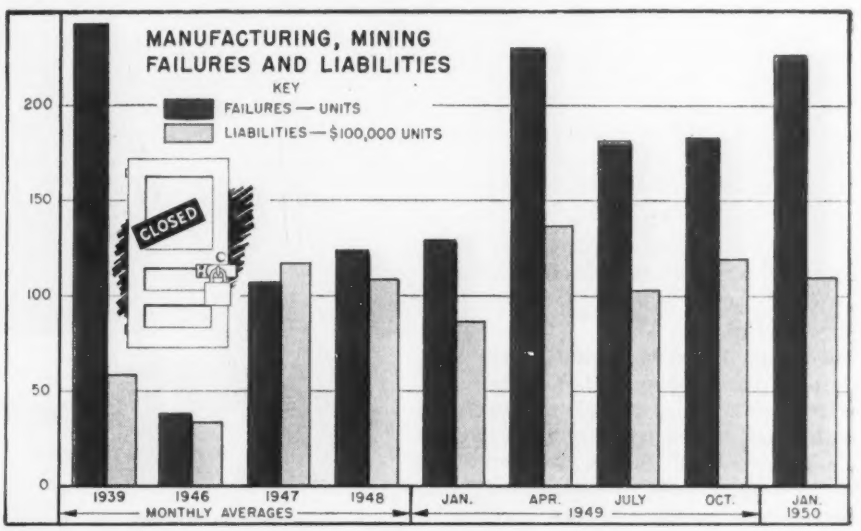
In manufacturing and mining the trend has been similar to that of all business.

In the last year of the war, manufacturing and mining failures averaged 25 per month. As competition returned and the weeding out process of marginal companies began, the failures started to move upward. As shown in the accompanying chart there was an increase in every postwar year over the preceding year in number of failures but the 1949 average did not reach the 1939 average. Monthly averages of failures in manufacturing and mining for the years shown are: 1939, 243; 1946, 39; 1947, 106; 1948, 123; and 1949, 186. In January, 1950, there were 225 failures in the manufacturing and mining classification.

Liabilities Higher — Liabilities for the period are higher than in the prewar years but a direct comparison is difficult because of higher costs in the postwar period.

In a study "Peaks and Valleys in Wholesale Prices and Business Failures" Roy A. Foulke, vice president, Dun & Bradstreet Inc. says, "There is no one factor which has such an immediate effect on the well-being of a business enterprise as the level of prices of the raw materials which a manufacturing concern uses, or the level of wholesale prices of the products which a wholesale or retail concern handles."

Mr. Foulke further states the principal reasons for business failures—lack of working capital, excessive liabilities, top-heavy fixed assets, inadequate sales, excessive inventories—are all results of faulty thinking that can be laid at the doorstep of the executive staff. Mistakes can be made and a business will survive, providing the general economic atmosphere is largely noncompetitive as is the case when demand is greater than supply. When we return to a competitive economy the marginal enterprises succumb.



Men of Industry

ERNEST R. BAXTER

FREDERICK W. BONACKER

FRED W. SCOTT JR.

Ernest R. Baxter was promoted from director of sales and sales administration to assistant vice president, **Carborundum Co.,** Niagara Falls, N. Y. **Frederick W. Bonacker,** sales manager, coated products division, was promoted to general sales manager of the company, and is succeeded in his former position by **Fred W. Scott Jr.**

—o—

Norman Hill was appointed manager, service products sales, **New Departure Division,** General Motors Corp., with headquarters at Bristol, Conn.

—o—

M. Russell Kambach was named advertising manager, **Aluminum Co. of America,** Pittsburgh. He is succeeded as assistant advertising manager by **Jay M. Sharp. A. H. Schmeltz** was named manager of the company's newly established patent department. Alcoa's patent activities formerly were a part of the research laboratory organization.

—o—

Albion Industries Inc., Albion, Mich., elected **Edwin Kondle,** president; **Ralph Brooks,** chairman of the board and general manager; **R. Davis,** vice president and treasurer; **Stephen Janus,** vice president in charge of sales; and **A. A. Magnotta,** secretary.

—o—

F. Carl Saacke was appointed safety engineer, **Air Reduction Co. Inc.,** New York.

—o—

Oldsmobile Division, General Motors Corp., Detroit, named **O. C. Farnsworth** southern regional manager, with headquarters in Memphis, Tenn. He succeeds **H. F. Banks,** transferred to the Detroit zone. Mr. Farnsworth, former zone manager in New York, is succeeded by **P. J. Monaghan,** former assistant zone manager in Chicago. **C. R. Swartz,** assistant zone manager, Philadelphia, was promoted to zone manager at Oakland, Calif., succeeding **Russell Lesher,** who goes on special assignments in the Pacific region.

—o—

James W. Elizardi was named manager of the Houston sales office of **Marley Co. Inc.**

—o—

Chandler-Boyd Co., Pittsburgh, appointed **Elmer A. Duffy** as manager of sales, succeeding **Frank J. Walton,** resigned.

—o—

Allen B. Wilson and **Alex L. Moll** were elected vice presidents, **Acme Steel Co.,** Chicago. Mr. Wilson will be vice president in charge of special products, and will continue his activities on new product and market development. Mr. Moll, as vice president in charge of strip steel sales, will head this sales division.

Albert P. Liggett was named assistant to executive vice president **D. S. Smith,** and **Kenneth E. Murphy** joins the legal department of **Perfection Stove Co.,** Cleveland, as assistant counsel.

—o—

J. C. Becker joined **Advance Pump Co.** as sales manager with headquarters at Berkeley, Calif.

—o—

Raymond E. Wagner was appointed district manager, Akron area, for **Peninsular Steel Co.,** Detroit.

—o—

Fred M. Gillies has resigned as works manager, and **A. P. Miller** has retired as general superintendent, Indiana Harbor plant, **Inland Steel Co.,** Chicago. **H. W. Johnson,** vice president in charge of steel manufacturing, will take over supervision of the plant. Mr. Gillies recently returned from a seven-month stay in Germany as production chief, U. S.-U. K. steel control group.

—o—

T. J. Roberts was appointed Houston district manager, industrial products division, **Johns-Manville Corp.,** New York. **Henry G. Palmer** was promoted to Atlanta district manager.

—o—

Robert Barber was appointed vice president and a director, **Univis Lens Co.,** Dayton, O.

—o—

Arthur L. Fleck was named general sales manager, **American Screw Co.,** Providence, R. I., succeeding the late **Charles O. Drayton.** Mr. Fleck was

ALLEN B. WILSON

ALEX L. MOLL

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Ohio MAGNETS

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assistant to Mr. Drayton for many years, and for the last ten served as manager of the Chicago office and warehouse.

—o—

C. F. Rock was appointed purchasing agent, **Cleveland Tankers Inc.**, Cleveland. **Vincent A. Elliott,** recently named vice president, continues as director of purchases.

—o—

Arthur L. Chapman was named general manager, **Colonial Radio & Television Division,** Sylvania Electric Products Inc., Buffalo. He succeeds **Edward E. Lewis,** resigned to establish his own business as an industrial management consultant.

—o—

John W. Goodwyn was appointed sales representative, **United States Graphite Co.,** Saginaw, Mich., and will establish headquarters in Chattanooga, Tenn.

—o—

Institute of Scrap Iron & Steel Inc., Washington, appointed **William J. Wolf,** who is president of Wolf & Co., Hamilton, O., and vice president of **David J. Joseph Co.,** Cincinnati, as chairman, national affairs committee; and **S. Allen Nathanson,** M. Cohen & Son Co., Cleveland, as chairman, public relations committee.

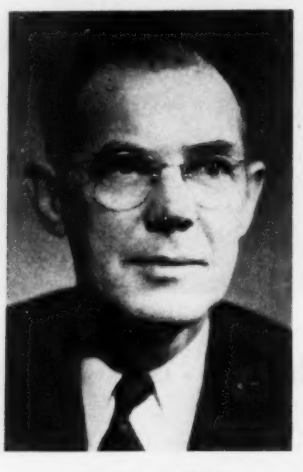
—o—

Ernest E. Brayshaw has joined **Continental Foundry & Machine Co.,** Chicago, in a sales capacity connected with the firm's rolling mill and heavy machinery products. He was with Southwest Steel Rolling Mills, Los Angeles, as works manager.

—o—

Gisholt Machine Co., Madison, Wis., promoted **Eugene A. Coombs** export sales manager. He will take up temporary residence in Paris, France. **Robert H. Bruce** succeeds Mr. Coombs and is now assistant general sales manager.

EUGENE A. COOMBS



ROBERT H. BRUCE

PAUL VAN WAGNER

Paul Van Wagner was elected vice president of sales, domestic and foreign marketing operations, **Copperweld Steel Co.,** Glassport, Pa. **William W. Ege** was appointed to the newly created post of vice president and chief engineer. **F. E. Leib** reports to Mr. Ege as chief electrical engineer. **P. A. Terrell,** assistant vice president, was promoted to vice president, responsible for business with the federal government. **Henry Oberle,** Copperweld's eastern district sales manager, was appointed utility sales manager.

—o—

Lee H. Lundy was appointed Philadelphia branch manager, **White Motor Co.,** succeeding **E. R. Kinnebrew,** who is taking over the company's distributorship in Memphis, Tenn.

—o—

Joseph H. Reid, manager, titanium division, **National Lead Co.,** New York, was elected a director and member of the company's executive committee, succeeding **Claude F. Garesche.**

—o—

S. D. Clarke Jr. was named purchasing agent, **Kerotest Mfg. Co.,** Pittsburgh, succeeding **E. T. Adams,** appointed district manager, Houston.

WILLIAM W. EGE

—o—

Harry G. McMurray, assistant superintendent, **Pontiac Motor Division** foundry, Pontiac, Mich., General Motors Corp., was appointed assistant manager, production foundry, Ford Motor Co.'s Rouge plant, Dearborn, Mich.

—o—

Roy D. Haworth Jr. was appointed manager, product development, carbide alloys division of **Allegheny Ludlum Steel Corp.,** Pittsburgh.

—o—

Ralph E. Larry, vice president, was transferred from New Castle, Pa., to the general offices of **Pittsburgh Limestone Corp.,** subsidiary, U. S. Steel Corp., at Pittsburgh. **H. Ward Lewis** was promoted manager of operations, with headquarters at New Castle. **J. N. Suliot** was promoted to assistant to Mr. Lewis, and **Howard W. Gibbs** to succeed Mr. Suliot as superintendent of the company's Moler Dolomite Quarry, Millville, W. Va.

—o—

George A. Dauphinais was appointed works manager, **Quaker Rubber Corp.,** Philadelphia, newly acquired division of H. K. Porter Co. Inc.

—o—

Herbert A. Stanton, vice president and general manager, foreign division, Norton Co., Worcester, Mass., was re-elected to the board of directors of **National Foreign Trade Council Inc.**

—o—

Pelton W. Ellis was named manager, refining equipment division, **Peabody Engineering Corp.,** New York.

—o—

W. M. Anderson was appointed southwestern district sales manager, with headquarters in Dallas, for **Westinghouse Electric Corp.'s** home

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radio division. He formerly was purchasing agent for the division.

—o—

Robert C. Tyson, assistant comptroller, **United States Steel Corp.,** New York, was elected comptroller. This position has been vacant for a number of years, its duties having been fulfilled during the interim by **Enders M. Voorhees,** chairman of the finance committee.

ROBERT C. TYSON

—o—

Pratt & Whitney Division, Niles-Bement-Pond Co., West Hartford, Conn., appointed **Joseph G. Brady** district sales manager, New York territory, for small tools and gages. He succeeds **J. C. Molinar** who became sales manager, small tools and gages. Added to the machine tool sales staff, New York office, are **John R. Batterson, Harry Randall** and **Denison C. Fuller;** at the Chicago office, **Arthur J. Laducer;** and at San Francisco and Los Angeles branches, **P. D. Brown.**

—o—

W. F. Crawford, president, Edward Valves Inc., East Chicago, Ind., was elected a director, **Central Scientific Co. of Chicago.**

—o—

William M. Hayden, manager of industrial research, Anaconda Copper Mining Co., has resigned to become president of **Chemetals Corp.,** whose new offices will be at 488 Madison Ave. after Apr. 1, with temporary headquarters at 522 Fifth Ave.

WILLIAM M. HAYDEN

—o—

Delbert G. Faust was appointed chief engineer of **C. A. Norgren Co.,** Denver. He was with Walter F. Kidde Co., Bellville, N. J., for 14 years, the last ten as chief project and test engineer.

—o—

Fred W. Nicholson Inc., Columbus, O., elected **William J. McLoughlin** secretary and **William B. Zipser** treasurer.

—o—

G. F. Maughmer was named apparatus department sales district manager in the Midwest for **General Electric Co.,** with headquarters in St. Louis. He formerly was manager, GE sales office in Los Angeles.

—o—

James F. Dailey was appointed purchasing agent, **National Tube Co.,** subsidiary, U. S. Steel Corp. He succeeds **G. Glenn Goe,** retired.

JAMES F. DAILEY

—o—

Thomas L. Coatney was appointed general sales manager, **Frederick Post Co.,** Chicago. He formerly served as general manager of that company's southwestern division, with offices in Houston, in which position he is succeeded by **Arthur C. Morales.**

—o—

O. S. Dollison, vice president and general manager, Republic Rubber Division, **Lee Rubber & Tire Corp.,** Youngstown, was elected president of the corporation. **E. M. Ikirt,** assistant treasurer, Republic Rubber Division, was appointed general manager of the division, and **R. W. Deemer** was appointed production manager and **H. M. Conner** credit manager. Mr. Deemer succeeds **H. W. Croysdale,** resigned.

OBITUARIES...

Archie Johnston, 64, an executive of **Ford Motor Co.,** Dearborn, Mich., for 26 years, died Feb. 28. He retired five years ago, and made his home in Saratoga, Calif. He was chief construction engineer for Ford and for many years director of Ford's rubber plantations in Brazil.

—o—

Thomas J. Creaghead, 83, one of the founders of the **National Association of Manufacturers,** died at his home in Covington, Ky., Mar. 3.

—o—

Dr. Horace W. Gillett, 66, former director, **Battelle Memorial Institute,** Columbus, O., died from a heart attack Mar. 3. He was responsible for the technical organization of Battelle, and served as its first director. He retired as chief technical adviser in 1949 and was technical consultant at his death.

—o—

Alfred D. Karr, 58, for 18 years an engineer with **Ingersoll-Rand Co.,** New York, died Feb. 28.

—o—

Charles A. Brown, 66, former vice president and general manager, **Lunkenheimer Co.,** Cincinnati, died recently. He retired in 1945.

—o—

C. Leon Brown, 50, assistant manager, flanging sales department, **Lukens Steel Co.,** Coatesville, Pa., died of a heart attack Mar. 3. He joined Lukens in 1926.

—o—

Barton A. Hinckley, 48, president, **General Water Heater Corp.,** Burbank, Calif., died Feb. 24.

—o—

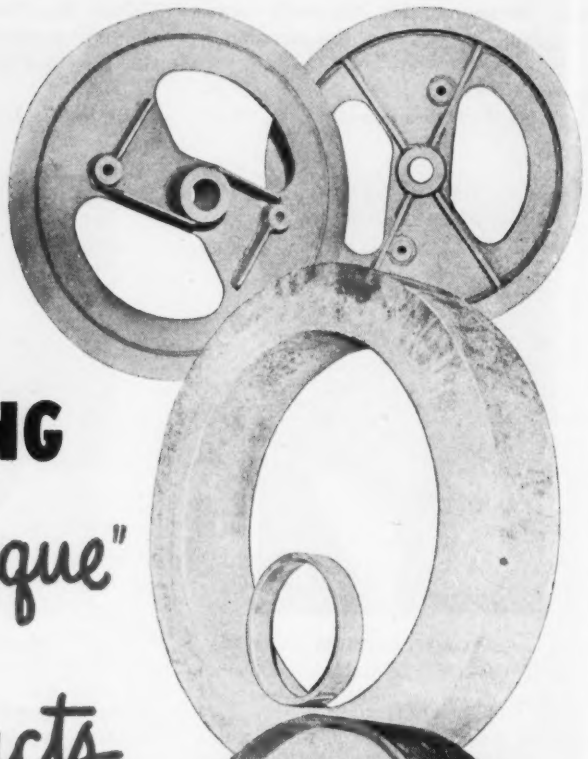
Omer L. Woodson, 54, vice president in charge of production, **Radioplane Co.,** Van Nuys, Calif., died Feb. 25.

—o—

John P. Maddigan, 74, retired president, **Buffalo Structural Steel Corp.,** Buffalo, died Feb. 25. He continued as a director after retirement.

—o—

William M. Levyn, 73, founder, **Acme Electric Welding Co.,** Los Angeles, died Feb. 28.



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Production AND Engineering
NEWS AT A GLANCE

FAST-ACTING COATING MATERIAL—A new vinyl resin formulation particularly effective in applications where metal is subject to deterioration from chemical or moisture attack is reported by Dampney Co. of America, Boston. The material which can be applied by either brushing or spraying is recommended by the company for service over an operating temperature range of minus 40 to 160° F wet or dry. It develops excellent adhesion to relatively smooth surfaces without heat curing, and air dries rapidly so that equipment can be placed in service one hour after coating. The material, which can be formulated in several colors, also can be used without fear of contaminating materials contacting coated surfaces.

IGNITRON TAKES TO THE RAILS—A small pool of mercury and a stick of graphite embodied in an electronic tube may shape the future of electrified railroads, Westinghouse engineers told members of the American Institute of Electrical Engineers meeting in New York. After playing a major wartime role in large scale production of aluminum and magnesium, the tube—called the ignitron—now is being harnessed for railroad use. Its job, as then, is to change alternating current electricity into direct current. Engineers say it may mean less costly railroad electrification.

STEEL HARDENER—Life of a tool steel drill can be increased as much as 300 per cent by a steel hardening compound developed by Doughty Laboratories Inc., New York. According to the concern process of fusing this chromium-rich material into the steel adds certain ingredients which have both a nitriding and alloying effect. The operation causes a hard outer surface to be formed on the steel which the company says is highly impregnable and resistant to wear, corrosion and high temperatures. As the core of the metal remains tough and flexible, constant redressing and breakage of tools are substantially reduced.

UNUSUAL INVESTMENT RETURN—A clever arrangement devised by Fitchburg Foundry Co., Fitchburg, Mass., enables it to employ a motive sandslinger to ram not only molds but also large cores. In achieving this objective, the company installed a small loop roller conveyor in the slinger's area of operation and constructed next to the conveyor a floor level sand hopper served by an inclined sand delivery belt. A special chute mounted on the slinger's bucket elevator permits sand to be fed directly to the buckets from the inclined belt. When cores are rammed, the slinger is positioned alongside the roller conveyor. Core sand is loaded into the floor hopper and carried by the belt to the chute on the slinger's bucket elevator. Core boxes are then rammed and moved along the conveyor to the finishing station.

OBTAINS GRINDING PATENT—A patent covering a centerless thread grinding process granted to C. W. Hopkins, chief engineer of Landis Machine Co., Waynesboro, Pa., is now held by the concern. The patent, which Mr. Hopkins assigned to the company is an improvement on the basic Lloyd patent covering centerless thread grinding controlled in North America by Landis. It covers exactly the process used by Landis on its centerless thread grinder for both through and in-feed thread grinding. Process covered makes possible successful grinding of threads formerly considered impracticable. It makes it possible to grind threads as coarse as four threads per inch from a solid bar in one pass.

DETERMINES PROPERTIES — Essential data for determining mechanical properties of metals and alloys at low temperatures is provided by a special reduction-of-area gage reported by National Bureau of Standards. Designed especially for testing metal specimens completely submerged in a temperature-controlled bath ranging from minus 196° to plus 100° C, the gage provides measurements accurate to 0.0001-inch. (p. 92)

NO SURE INDICATOR—Because of different conditions existing, even in furnaces of the same type, it is impossible to predetermine the exact refractory that will perform best in each part of a piece of equipment. There are generally approved selections that are satisfactory in a majority of cases, but only actual production runs can determine the precise refractory which will render most economical service in any individual furnace. This is why it is so important to determine as accurately as possible causes of refractory failure. (p. 94)

"TROUBLE SHOOTER" — Besides keeping an automatic, continuous check on reject rates of mass-produced items, a new quality control device developed by General Electric Co., makes it possible to locate and remedy abnormal production difficulties as quickly as they occur. Essentially an electric calculating machine, instrument counts number of items produced and those rejected indicating on a meter whether percentage of rejections is above or below an acceptable level at any given instant. (p. 99)

BASED ON SKILL — In the forge man's language, plastic metal is "flowed" to a new shape by forging pressure, either impact pressure as provided by a hammer or push pressure as rendered by a press. While results are the same, there is a difference between the two. In the former, maximum striking energy is available at instant the striking die face touches hot metal. In the latter there is little energy in the push but pressure builds up as the push continues. This difference indicates that skill and experience are required in the proper use of forging tools. (p. 106)

News Summary—p. 61 *Market Summary—p. 145*

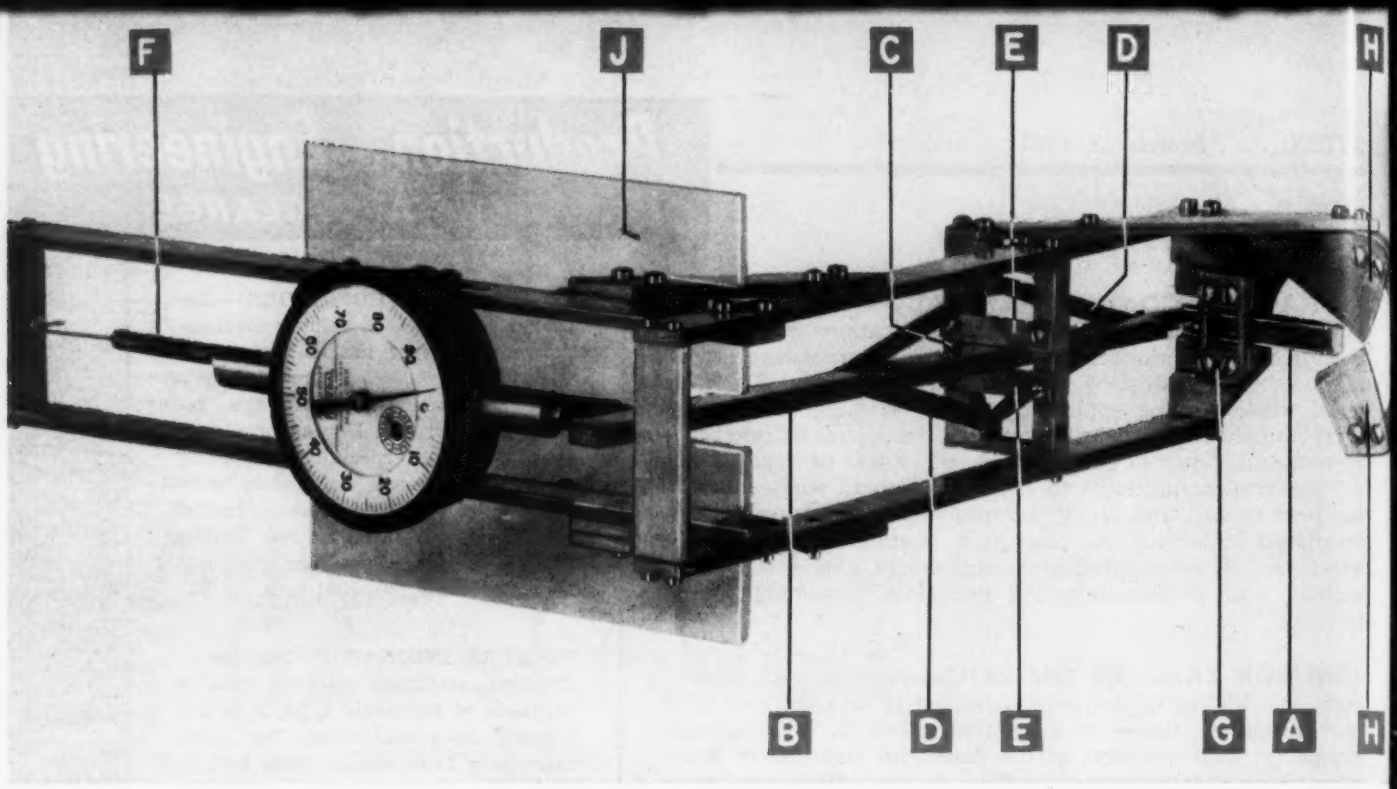

Fig. 1—Close-up of gage. (A) Sliding anvil, (B) lever, (C) pivot, (D) flexure, (E) guide bars, (F) tension spring, (G) retainer caps, (H) fixed anvils, (J) shield

Reduction-of-Area Gage

HELPS DETERMINE MECHANICAL PROPERTIES OF METALS AT LOW TEMPERATURES

ESSENTIAL data for determining some of the mechanical properties of metals and alloys at low temperatures is provided by a special reduction-of-area gage, developed by the National Bureau of Standards. Needs for a gage to follow accurately the change in diameter of a cylindrical specimen submerged in a refrigerant became evident during the bureau's investigations of the influence of temperature on the properties of metal.

For some metals, an accurate determination of the stress-strain curve from yield to maximum load cannot be made from extension measurements—the conventional procedure—because the metal may contract locally before reaching the final maximum load. Simultaneous load and diameter measurements are essential moreover for the determination of the complete true-stress vs true-strain curves for metals tested in tension. With the bureau's new gage, successive diameter measurements are now possible during the entire deformation of the specimen.

Designed especially for use in tests of metal specimens completely submerged in a temperature-controlled bath ranging from −196°C to +100°C, the gage provides measurements accurate to 0.0001-inch. A careful calibration of the gage using test standards of fused quartz indicates its diameter measurements to be identical, to the nearest one ten-thousandth of an inch, with those made with the optical comparator. True stress-true strain curves for a wide variety of metals, including annealed ingot iron, cold-worked nickel, and cold-worked 18:8 chromium-nickel steel, have shown its performance to be very satisfactory.

Gage Construction—The gage consists essentially of one sliding and two fixed anvils connected through a lever mechanism to a dial gage. This arrangement is such that when the specimen is placed between the three anvils, any slight movement in the sliding anvil due to a change in the specimen will be accurately registered on the dial gage. The anvils are made of SAE 52100 steel and the lever and pivot knife edge of AISI type 440C stainless steel, heat treated for hardness values of Rockwell C63 and C55, respectively. Framework of the instrument is constructed of cold-rolled Monel, which has suitable corrosion resistance and strength.

During a tension test the change in diameter of the test specimen is followed by the movement of the sliding anvil which is held against the specimen with slight pressure exerted by a tension spring. Movement of this anvil is transmitted to the spindle of the dial indicator by means of a simple lever whose pivot or fulcrum is a knife edge. To maintain the lever in position, it is supported by four flexure strips. A lubricated roller, ball, or sleeve type bearing can-

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Fig. 2—To obtain data of the mechanical properties of metals at −188 or −196°C, the specimen is fully submerged in a bath of liquid air or liquid nitrogen contained in a specially-designed apparatus which houses the specimen in position for test under the 50,000-pound capacity testing head. Changes in diameter of specimen are followed accurately with the NBS gage as specimen is extended to fracture at temperature of the refrigerant

not be used as the fulcrum for the lever because this portion of the instrument is submerged in the temperature-controlled liquid bath.

Installation Facilitated—The sliding anvil is attached to the lever arm with a small tension spring to facilitate installation of the gage on the tensile specimen while immersed in the liquid bath. Six ribs on the anvil serve as the bearing surfaces. Both ends of this anvil and the contact ends of the fixed anvils are machined to a dihedral angle of 50 degrees and a radius of 0.02-inch. This design assures free access of the measuring contact edges of the anvils to the minimum-diameter portion of the tensile specimen.

Contact edges of the anvils are co-planar and at an angle of 60 degrees to each other. With this arrangement, the movement of the sliding anvil is 1.5 times the change in diameter of the test specimen. Length of the lever arm between the pivot knife edge and the anvil knife edge is approximately 2.5 inches; length of the lever arm between the pivot knife edge and the contact point of the dial indicator is approximately 5 inches. Thus the total magnification of the instrument is approximately 3 (2.985 by actual calibration).

Dial indicator is a jeweled low-friction type and is mounted on the framework so that it is adjustable.

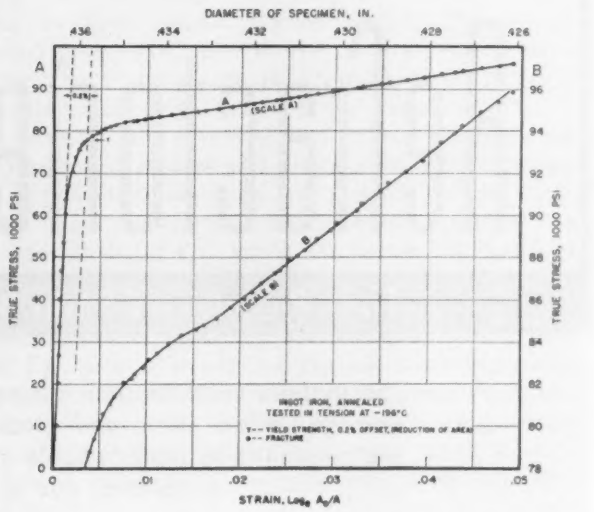


Fig. 3—True stress-true strain curve for a specimen of annealed ingot iron tested in tension at −196°C showing the complete true stress-true strain curve (A), and portion of the true stress-true strain curve from yield to fracture on a more open stress scale (B). Diameter measurements essential for determination of these curves were obtained through use of the reduction-of-area gage. Maximum deviation of any point from the curve corresponds to a change in diameter of less than 0.0001-inch. Bulge in lower portion of curve B indicates tendency to a drop of beam at yielding for the initially annealed ingot iron at this temperature

Its range is selected to conform to the ductility of the metal being tested.

Simple Manipulation—Manipulation of the new gage to determine the change in diameter of an unnotched cylindrical specimen during a tension test at low or moderately elevated temperatures is very simple. The test specimen supported vertically between the adapters of the tensile testing machine, is completely submerged in the temperature-controlled liquid bath. The gage is placed in position on the specimen with the measuring anvils at any position along the gage length of the specimen, and a time interval of about 15 minutes is allowed for the gage to come to temperature equilibrium.

Alignment of the gage with respect to the specimen is adjusted until a minimum-diameter reading is obtained, indicating that the plane of the measuring anvils is perpendicular to the axis of the specimen. While maintaining this alignment, the gage, supported by hand, is moved up and down through the gage length of the test specimen to find the diameter at the minimum cross section.

The gage can also be used to follow the change in diameter of circumferentially notched cylindrical specimens during test in tension at low or moderately elevated temperatures. For this purpose a set of anvils whose measuring edges are machined to an angle less than the smallest notch angle of the test specimens is required. Radius of the measuring edges of the anvils likewise must be less than the smallest radius at the root of the notch.

Refractories

. . . Types, Properties and Service Behavior

By R. P. HEUER
Vice President
and
C. E. GRIGSBY
Service Research Engineer
General Refractories Co.
Philadelphia

The authors continue their discussion of the remaining refractory groups, namely: Silica, basic and special. Advantages and limitations of each are presented to better enable you to lower refractory costs and increase production due to less downtime for relining

PART II

SILICA ranks second to fireclay as the most-used refractory material, comprising about 22 per cent of all refractories produced. There are three types of brick, each containing over 95 per cent of SiO_2. Silica refractories are also made by hewing or sawing natural siliceous rock into blocks and shapes.

The great majority of the silica refractories are what may be termed regular silica (as distinguished from natural rock silica), special silica and super duty silica.

Regular silica brick, like the other two types, are made of quartzite bonded with about 2 per cent of lime. In burning, the natural mineral quartz is converted to crystalline forms known as tridymite and cristobalite, which differ from quartz principally in respect to their thermal expansion curves. Cristobalite, the principal constitutent of well-burned silica brick, has a large, practically instantaneous, reversible thermal expansion (almost 1 per cent linear) at the inversion point between the high and low temperature forms. The inversion point lies between 390° and 530° F and is usually about 450° F. Because of this sudden expansion, silica brick are prone to crack and spall unless care is exercised in heating them up and cooling them down. At least 5 hours should be taken to raise the brick's temperature to a dark red heat, in order to avoid its cracking. Once above red heat (1000 to 1200° F) they are practically spall proof, since their volume change is negligible within the temperature range of 1200 to 2900° F. Their excellent resistance to both lime and iron oxide at open-hearth temperatures is due to the phenomenon of liquid immiscibility, as previously explained. Because of their property of remaining rigid almost up to the fusion point, they are widely used in sprung arches of large span.

For applications where regular silica brick spall excessively because of repeated passage through the temperature range of cristobalite inversion, a special silica brick is available. Our brand of this type refractory is known as Yough. These brick have lower thermal expansion, especially in the inversion range, with consequently less tendency to spall.

Recommended For Most Severe Service — Super

Fig. 5 — At left is shown the "bursting" of iron oxide in chrome brick while at right is seen how fireclay brick appears after disintegration by carbon monoxide in a laboratory test. Illustrations courtesy General Refractories Co.

duty silica brick are made in the same general way as regular silica brick, but the quartzite used is either selected for special purity or is processed to reduce the alumina, titania and alkalies. The extra purity gives greater resistance to slag corrosion. Because of higher price and limited supply, these brick are normally used where the service is most severe.

Often called silica fire clays, these silica mortars are made in various grades, known as regular, coke oven and special grade. The special grade has superior refractoriness, water retention and troweling properties. Super grade silica high temperature bonding mortar contains no clay or sodium silicate, has extra-fine grind and workability, very low alumina content, and refractoriness practically equal to that of regular silica brick.

The essential properties of silica refractories are obtainable in the form of silica ramming mixes used largely for patching purposes. There is also raw ground silica ganister in various grain sizes for mixing with clay or other bonding ingredients. These are used mainly for patching. Common sand is still used to some extent in its natural state in bottoms of the acid open-hearth, acid electric furnace and malleable furnace.

Diatomite is a natural siliceous mineral with high porosity that is used mainly for its heat insulating properties. It is not particularly refractory and finds use mainly as a back-up insulating material.

Blocks of sandstone or highly siliceous mica schist are used to some extent in bessemer converters, soaking-pits, mixers, hot metal cars and cupolas. Fused silica has very low thermal expansion, and is used mainly for making chemical and laboratory ware that is highly resistant to thermal shock. It finds little use in commercial furnaces.

Best For Resisting Basic Slags—Basic refractories comprise those products made usually from dead-burned magnesite, chrome ore or mixtures of these materials. Prime reason for their use is their ability to resist basic slags. As a group, basic materials—in contrast to the alumina-silica group—exhibit much greater refractoriness and better resistance to chemical attack of basic slags and metallic oxides. Magnesite is particularly suitable for resistance to attack by iron oxide, but it tends to shrink and spall at high temperatures. Chrome ore shows good resistance to lime and iron oxide, but brick containing it may burst from action of iron oxide in open-hearth steel furnaces, or in other furnaces where iron oxide is present. Neither magnesite nor chrome brick has exceptional load-carrying ability, which accounts for the fact that basic refractories must often be supported to make their use practical in certain furnace areas.

To fill the urgent need of the metals industries for basic brick possessing the proper resistance to chemical attack of basic slags, together with suitable physical properties to satisfactorily withstand spalling, shrinkage and load, we developed and patented in 1928 the Ritex process which produced an improved basic brick for industry. The process is characterized by the following three very distinctive features: 1—Use of gap sizing, instead of the usual grain sizing, of particles to insure best interfitting of the grains. 2—Formation of the brick under high pressure to thoroughly consolidate the gap-sized particles and 3—bonding of the formed brick without kiln firing by use of highly refractory bonding agents.

Development of the process, and its application to new compositions containing mixtures of chrome

Fig. 6—Table showing thermal conductivity of the various types of refractory materials

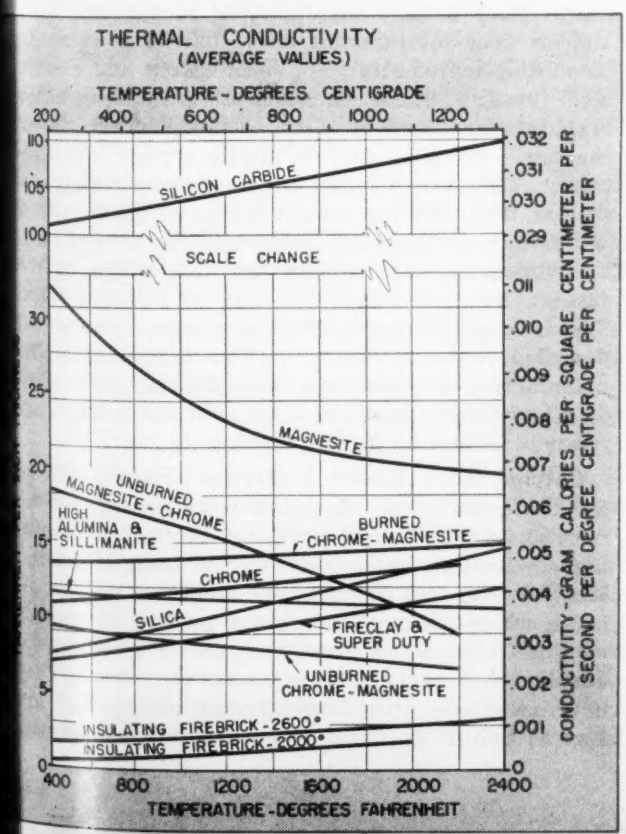
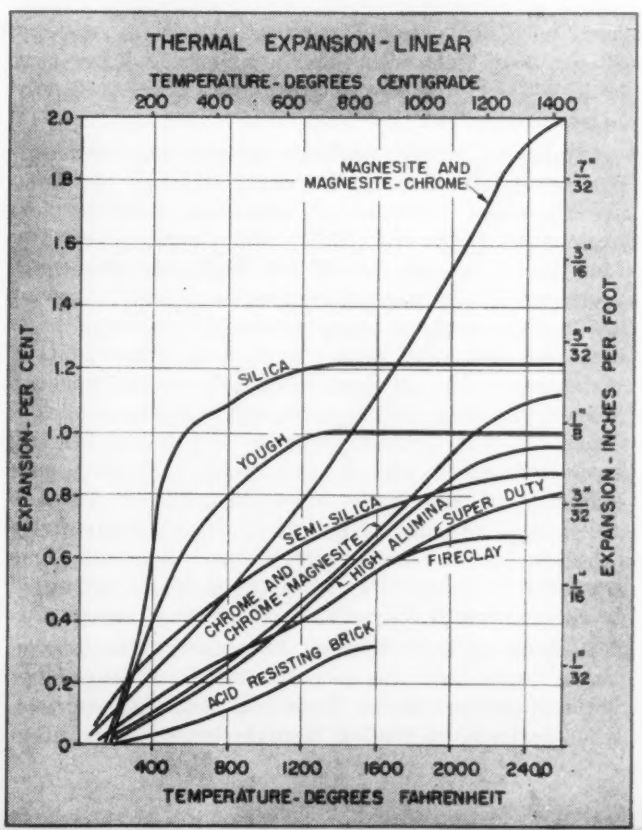

THERMAL CONDUCTIVITY
(AVERAGE VALUES)
TEMPERATURE - DEGREES CENTIGRADE
200 400 600 800 1000 1200
SILICON CARBIDE
SCALE CHANGE
MAGNESITE
UNBURNED MAGNESITE - CHROME
HIGH ALUMINA & SILLIMANITE
BURNED CHROME - MAGNESITE
CHROME
SILICA
FIRECLAY & SUPER DUTY
UNBURNED CHROME - MAGNESITE
INSULATING FIREBRICK - 2600°
INSULATING FIREBRICK - 2000°
CONDUCTIVITY - GRAM CALORIES PER SQUARE CENTIMETER PER SECOND PER DEGREE CENTIGRADE PER CENTIMETER
.032 .031 .030 .029 .011 .010 .009 .008 .007 .006 .005 .004 .003 .002 .001 0
110 105 100 30 25 20 15 10 5 0
400 800 1200 1600 2000 2400
TEMPERATURE - DEGREES FAHRENHEIT

Fig. 7—Thermal expansion is presented graphically for different types of refractory brick


THERMAL EXPANSION - LINEAR
TEMPERATURE - DEGREES CENTIGRADE
200 400 600 800 1000 1200 1400
MAGNESITE AND MAGNESITE - CHROME
SILICA
YOUGH
SEMI-SILICA
CHROME AND CHROME - MAGNESITE
HIGH ALUMINA
SUPER DUTY
FIRECLAY
ACID RESISTING BRICK
EXPANSION - PER CENT
2.0 1.8 1.6 1.4 1.2 1.0 0.8 0.6 0.4 0.2 0
EXPANSION - INCHES PER FOOT
7/32" 6 3/4" 5/32" 1/8" 3/32" 1/16" 1/32"
400 800 1200 1600 2000 2400
TEMPERATURE - DEGREES FAHRENHEIT

Refractories

ore and magnesite, is one of the outstanding advances in brick manufacture. Superior characteristics of the new brick were immediately recognized by the consuming industries, and they were rapidly adopted for severe sections of ferrous and nonferrous metallurgical furnaces operated under basic processes. The unique advantages of these brick compared to burned brick of comparable composition include: Lower price, better workmanship, lower porosity, lower thermal conductivity and greater resistance to thermal shock.

Four major types of basic brick are produced—chrome, magnesite, chrome-magnesite (a mixture in which chrome ore predominates), and magnesite-chrome (a mixture in which magnesite predominates). Chrome brick are available only as burned brick; the other three types are supplied either burned or unburned.

Basic brick are frequently laid with steel sheets in the joints. The use of these sheets increases resistance to spalling and eliminates mortar. Sheets may be cut to size and laid between the bricks, or formed sheets in a "U" shape may be placed around the formed brick before laying. Unburned brick may have their sheets permanently affixed to the brick at the time of molding, thereby becoming an integral part of the brick—as in Steelklad products which we produce. Our unburned basic brick are likewise available with Ferroclip metal hanger sockets for use in suspended constructions, either as roofs or walls.

Most Resistant To Iron Oxide—Magnesite brick are made of 100 per cent magnesite, and are available either burned or unburned. The burned brick are made in two varieties. Regular burned magnesite brick usually contain about 85 to 90 per cent MgO and 5 to 6 per cent Fe_2O_3. The other variety, made from specially selected magnesite, contain at least 90 per cent MgO with the Fe_2O_3 held to 2 per cent or less. These low iron magnesite brick are used only to a limited extent.

Magnesite brick, whether burned or unburned, possess the three following characteristics: 1—They are the most resistant of any basic refractory to iron oxide. Magnesia (MgO) will absorb practically four times its own weight of Fe_2O_3 to form magnesioferrite, a refractory compound melting at about 3180° F, having the composition 20.2 per cent MgO and 79.8 per cent Fe_2O_3. It is this property that makes magnesite the best refractory for the working hearths of basic open-hearth and electric steel furnaces. 2—The highest thermal expansion of any basic refractory and 3—the highest thermal conductivity of any basic refractory, and a negative coefficient of conductivity; that is, the conductivity decreases as the mean temperature increases. This property of magnesite is imparted to all unburned brick containing 25 per cent or more of magnesite.

Because of high thermal expansion, burned magnesite brick are the most sensitive of any basic brick to thermal shock. Their load resistance is somewhat better than that of burned chrome brick. Mag-

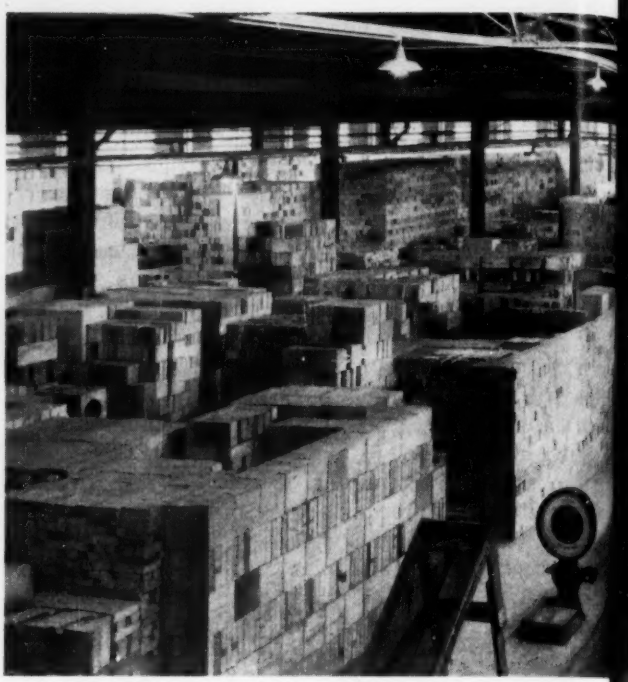


Fig. 8—Storage area in a modern refractories plant presents an appearance of methodical neatness which expedites delivery of many hundreds of orders daily

nesite brick, whether burned or unburned, have the highest shrinkage of any basic brick because of the tendency of their periclase crystals to consolidate into larger crystals.

Dead-burned magnesite grains of various sizes are used for the construction and maintenance of sintered melting hearths of basic open-hearth and electric furnaces.

Magnesite ramming mixes are grain-sized, air-setting mixtures composed largely of dead burned magnesite. They usually contain 60 to 80 per cent MgO and are used for ramming either partial or complete monolithic bottoms in basic open-hearth and electric steel furnaces. These materials are rammed in under high pressure, and may be installed directly over the basic brick or over a plastic chrome ore subhearth. They may be used either as the working surface or they may have a few inches of grain burned in above them. Their principal advantage over burned-in bottoms is one of time savings—which in the case of an open-hearth amounts to about a week. The tonnage of magnesite consumed as grains and ramming mixes is about equal to that used in the manufacture of basic brick. Ground magnesite—called standard furnace magnesite—is used for laying magnesite brick and for making repairs.

Chrome Brick Resists Hydration—Burned chrome brick are made of 100 per cent refractory chrome ore. They are characterized by thermal expansion and conductivity much below that of magnesite brick. Most chrome ores contain low-fusion magnesium silicates, which produce enough low melting compounds so that there is no great increase in resistance to spalling over that of burned magnesite brick. They have relatively poor load-carrying ability, and are less resistant to basic slags than are magnesite

brick, since they may form chromates with alkalies and alkaline earths, and may absorb iron oxide and expand in an action called "bursting." Compared to magnesite brick, chrome brick cost less and will not hydrate in the presence of moisture. Magnesite brick sometimes hydrate during ordinary shutdowns.

Plastic chrome ore, an air-setting plastic form of ground chrome ore with bonding agents added, offers users the chemical properties of chrome ore in a convenient form for low-pressure ramming. It is much used for forming solid, almost impenetrable, monolithic sections and for patching.

Chrome-base mortars, with or without added magnesite, and generally air-setting, are available for bonding and coating basic brick and for laying and coating other types of brick as a protection from the attack of basic slags. Chrome castables are likewise available to provide a chrome ore refractory in a hydraulic-setting form for casting special shapes or pouring monolithic sections.

Unburned magnesite-chrome brick, with or without steel sheets, are widely used in the ferrous and nonferrous metals industries. These brick have several advantages over either burned or unburned brick made of 100 per cent magnesite. Chief of these are lower cost, lower thermal conductivity, higher resistance to load, better volume stability, higher resistance to spalling, and substantially equal resistance to most slags. They are usually composed of about 75 per cent magnesite and 25 per cent refractory chrome ore.

Chrome-magnesite brick is by far the most-used type of basic brick. Refractories of this composition, about 75 per cent chrome ore and 25 per cent magnesite, are produced either burned or unburned. The unburned brick are priced lower than burned brick, have thermal conductivity about half that of the burned brick, and show greater resistance to thermal shock. A brick containing chrome ore to which magnesite has been added shows improved volume stability, and chrome-magnesite brick are the most volume stable of all basic brick at temperatures of 3000° F or above. These brick are also superior to either magnesite or magnesite-chrome brick in their resistance to thermal spalling, largely because of their lower thermal expansion (about half that of magnesite brick at 2400° F). They are also available with steel plates covering the four major faces.

Because both the burned and unburned chrome-magnesite brick of the usual 75-25 composition are subject to iron oxide "bursting," there has been developed a special unburned brick using about 60 per cent coarse chrome ore and 40 per cent fine magnesite, so compounded that the fine magnesite forms a protective coating about the coarse grains of chrome ore. Thus the magnesite (which will absorb four times its own weight of iron oxide without serious loss of refractoriness) slows down the action of iron oxide on the chrome ore. These brick have been highly successful in basic-ends and the all-basic open-hearth steel furnace. We produce them plated or unplated, and with or without a clip for suspended construction.

Recommended For "Crock and Cover"—Electrically-fused magnesia refractories, both brick and shapes, are made largely from pure, electrically-fused MgO, and contain 94 to 96 per cent magnesium oxide. Fusion point varies from about 3990 to 4530° F, and thermal conductivity, resistance to load, and thermal expansion are not greatly different from those of ordinary burned magnesite brick. They are chemically basic and are used for "crock and cover" or brick linings for indirect arc furnaces, as blocks for the melting section of vertical ring induction furnaces, and for crucibles in high-frequency coreless induction furnaces.

Dolomite is a refractory which is a natural combination of magnesium and calcium carbonates. It is much cheaper than magnesite and is used in furnace bottoms. As a patching material, it is used more than any other basic refractory. The lime content promotes slaking. In some refractory compositions it is mixed with magnesite or brucite. Repeated attempts have been made to manufacture a suitable dolomite brick. These brick have not been adopted in this country, although they are used somewhat in Europe.

Dolomite finds its principal use in the form of dead-burned grain and in the raw state. There is a cold-ramming, air-setting grain mixture composed of high-lime magnesite that is used for ramming bottoms in basic open-hearths and electric steel furnaces, but this material contains no free lime and much higher MgO than true dolomite.

Lime was used in forge walls from very early times but has been used only to a limited extent as a refractory, even though it possesses a high melting point. Its disadvantage is that it absorbs moisture and certain gases too readily to make it practical in competition with magnesite.

In the classification of special refractories are listed materials having very unusual properties, including ultra-high fusion points and thermal conductivities. Some of these materials find considerable use, as for example silicon carbide, carbon or

graphite. Others, because of high cost, are employed only for restricted, special applications.

Silicon carbide is a product of the electric furnace. It has no fusion point, but dissociates above 4532° F. It is processed much like other refractory materials. Brick made from SiC are unique in many of their properties. They have the highest thermal conductivity of any refractory: 10 to 12 times that of fireclay. They have the greatest hardness and resistance to abrasion and the greatest mechanical strength at high temperatures of any brick available. Their crushing strength at 2462° F is in excess of 10,000 psi. They show no contraction in the 5-hour reheat tests at 2912° F, and possess the highest resistance to thermal shock of any widely used refractory material.

Silicon carbide brick are made in a great variety of mixes, each particularly suited to a specific set of service conditions. The old trouble with oxidation and the resultant growth due to conversion of silicon carbide to silica has been practically eliminated (if the best available mix is chosen for the particular service conditions).

Carbon, in the ordinary sense, is infusible. It volatilizes without melting at ordinary pressures. (Graphite slowly sublimes above 6500° F). Carbon in all forms is consumed rapidly at temperatures above bright red heat under oxidizing conditions, a factor that has limited its usefulness. Thermal expansion of both carbon and graphite is well below that of commercial ceramic refractories. The thermal conductivity may be either moderate or high, as required. Both carbon and graphite have the unusual property of not being wetted by either metal or slag and consequently are little affected by them. For this reason they are frequently employed as slag and runner troughs for iron blast furnaces, as molds for the casting of various metals, and as hearth and partial linings of blast furnaces. Mixtures of graphite and fire clay are used in forming crucibles for melting metals.

Forsterite is a burned magnesium-silicate material usually made largely of olivine with a small amount of dead-burned magnesite added. The burned brick consist largely of the mineral forsterite ($2MgO.SiO_2$) which has a fusion point of 3470° F. The thermal conductivity of forsterite brick does not differ greatly from that of fireclay brick at high temperatures. They show little shrinkage in reheating at 3000° F, and are able to support considerable load at high temperatures. Chemically, they are neither acid or basic, but are attacked more readily by acid slags than by basic slags. Forsterite brick have been used to a limited extent in the metal industries.

Fig. 9—Packed for export shipment, refractories get fast, safe handling on skids

Used For High Temperature Electric Furnaces—Zirconia (ZrO_2) is one of the most refractory of all substances, having a melting point of 4919° F. It is also relatively resistant to molten silicate slags and other corrosive substances and is characterized by high strength, hardness, freedom from spalling, resistance to slag attack and abrasion.

Zirconia refractories are available in Europe either as crucibles or as brick. In spite of their characteristics, they are used only to a limited extent—largely because of their high cost. Principal uses are in electric furnaces being operated at very high temperatures and in the refining of precious metals.

Zircon refractories are made of zirconium silicate and contain about 64 per cent ZrO_2 and 35 per cent SiO_2. The softening point is about 4620° F. The brick are very resistant to thermal shock and to change of volume. They are used principally in aluminum melting furnaces, due largely to their property of not being readily wetted by aluminum metal, dross or oxide. The brick are so heavy that pieces of brick or spalls will not float in aluminum or the common alloys of aluminum, thus giving cleaner metal. Because of their high cost, some operators find 60 per cent alumina brick more economical. Others prefer silicon carbide brick, which are also not wetted by aluminum. Zircon mortars are used to some extent as a protective coating for other types of refractories.

Refractory crucibles comprising 99 per cent beryllium oxide (BeO) are used when temperatures are too high to permit use of alumina crucibles. Beryllium oxide has a melting point of 4568° F, and crucibles made from it are usable at temperatures above 3632° F. These crucibles are chemically neutral and have a dense, vitreous, porcelain-like, translucent structure.

Various metals and alloys are widely employed in the role of refractories to resist moderately high temperatures; platinum and certain allied metals have important applications in the broad realm of refractory uses. Mica schist, sandstone, quartzite and soapstone are still used to some extent as refractories. Talc is used for small articles. Pyrophyllite is being considered both in block form and as a batch constituent of synthetic refractories. Olivine or dunite has been tried on a large scale to replace chrome ore in steel furnaces. Asbestos-clay mixtures have been used as partitions, and fire clay-graphite mixtures are used as pouring pit refractories and crucibles. Ceramals, obtained by combining metals and ceramic materials, are a new type of product, sometimes having high refractoriness and strength at elevated temperatures. (*Please turn to Page* 124)

Instantaneous Quality Control

. . . new method of reducing manufacturing costs

Stripped of its two serious drawbacks, time delay and involved calculations, the powerful management tool—statistical quality control—is now available to mass-production industries on a simplified, automatic basis

A NEW device which can be instrumental in assuring the highest possible quality of most mass-produced items, and reduce manufacturing costs at the same time, was recently revealed by General Electric. (See STEEL, Jan. 30, p. 17). The instrument, an electric computor which is called a "quality control indicator", keeps an automatic, continuous check on reject rates in manufacturing operations, and makes possible the location and remedy of abnormal production difficulties as quickly as they occur.

Developed by the G-E general engineering and consulting laboratory for the appliance and merchandise department, the indicator is in operation on the G-E refrigerator assembly lines at Erie, Pa.

Statistical analysis of production and rejection rates in the past has been made by time-consuming computations, lagging behind production by hours or days. During such a lag, it is possible for an abnormally-high rejection rate to go undetected. Although eventually caught, these defective parts in the meantime have created manufacturing losses and slowed production.

Lag Eliminated—The new instrument eliminates this lag. Essentially an electric calculating machine, it counts the number of items produced and the number rejected, and indicates on a meter whether the percentage of rejections is above or below an acceptible level at any given instant. Two useful by-prod-

Fig. 1 (below)—Refrigerator compressors moving along this assembly line are counted as they pass between light sources (right) and photoelectric cells (left) on either side of line. The electric eyes count the number of articles produced, and inspectors press a button whenever one is rejected. These two signals are registered on a quality control indicator

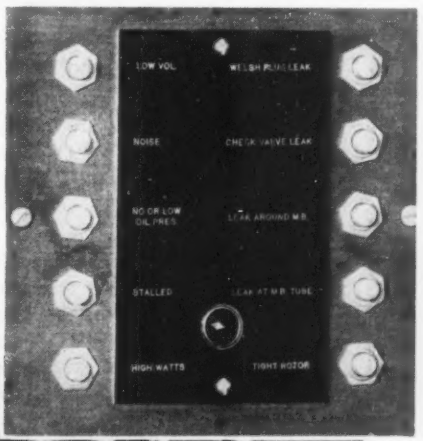


Fig. 2 (right)—Set of pushbuttons used by inspectors on the G-E refrigerator assembly line. Buttons, each one labeled with the name of the defect for which inspectors test, are connected to a calculating machine which indicates on a meter when reject rates rise above a predetermined level. Each button has a correspondingly-labeled meter, located in a central panel

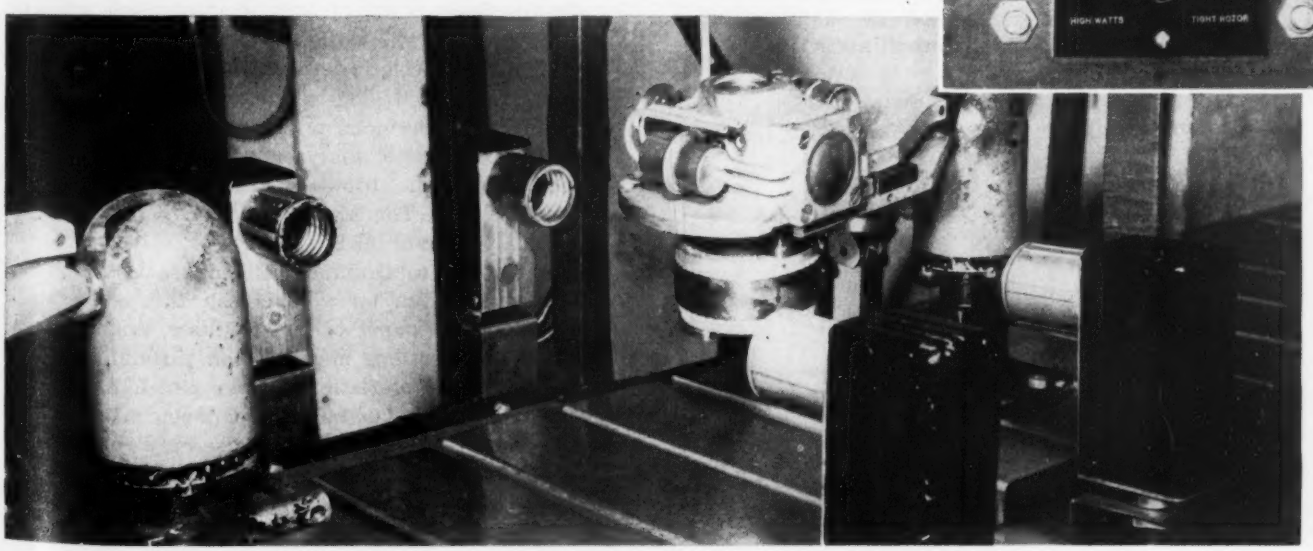


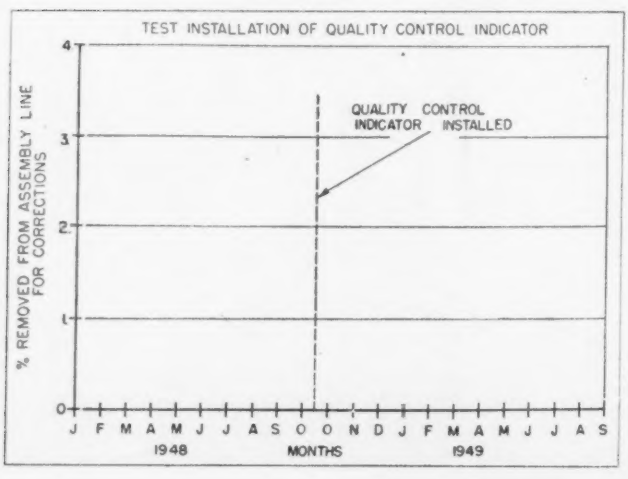
Fig. 3—This bank of meters shows manufacturing supervisors whether reject rates are above or below an acceptable level at inspection points along the refrigerator assembly lines

ucts of the indicators are fewer defective parts occupying space on the production line, with a resultant higher output for the same number of parts handled and greatly reduced scrap and rework costs.

Reject rate on parts controlled by the indicator was cut more than 60 per cent in one trial installation. On a compressor assembly line, this rate dropped from an average 2.7 per cent for a check of five characteristics to 0.89 per cent in 6 months in the pilot installation.

Signalling Devices—In practice, the indicator uses various signalling devices, such as an "electric eye" or a switch tripped by passing objects, to count the number of articles produced. Every time an inspector rejects a unit, he pushes a button, and this causes a change of reading on the indicating meter. When the reject level at an inspection station exceeds a predetermined rate, the needle on the meter moves from the green half of the scale to the red half, indicating to suprvisors that corrective action is needed.

Fig. 4—Chart showing how the percentage of rejects on a manufacturing operation was reduced in a 2-year test of the quality control indicator. Reduction in the number of parts rejected from the production line means greatly reduced manufacturing losses and better over-all quality



The indicating equipment need not be set up near the production line, but may be installed in the offices of supervisory personnel. At the Erie Works test installation, engineers have set up a large, centralized instrument panel which indicates reject levels for each of several characteristics checked by inspectors on the refrigerator assembly lines.

The indicator may be used on any production line, wherever continuous inspection and testing are required. Manufacturers of automobiles, appliances, electronic equipment and other mass produced articles should find it valuable for monitoring quality characteristics of their products, G-E engineers said. It can be applied to manufacturing operations where inspection is performed by automatic as well as manual methods. No additional production or supervisory personnel are necessary to operate the new equipment.

Two Units—Basic equipment consists of two units: A "totalizer," which counts the units inspected, and a "characteristic analyzer," which counts the rejects for a given characteristic checked by inspectors. The "quality" meter, showing whether rejections are above or below a predetermined level, is mounted on the front panel of the characteristic analyzer.

On the front panel of each characteristic analyzer is a selector on which the acceptable reject rate may be set. Reject levels ranging from zero to 10 per cent may be monitored. The quality level to be used is determined by previous production experience.

The characteristic analyzer is roughly the size of a shoebox; and the totalizer the size of a portable typewriter case. The equipment may be run on either 110-v 60-cycle ac or on 110-v dc.

Count of the total number of manufactured articles inspected is given on a dial seen through a small opening on the panel of the totalizer, and the total number of rejections may be seen through an opening in the characteristic analyzer panel. At the end of a production of 2000 units, the device may be reset.

In general, it is necessary to use only one totalizer for each production line, and a characteristic analyzer for each characteristic being checked by inspectors, G-E engineers said.

WHAT YOU SHOULD KNOW ABOUT

CORROSION OF FERROUS METALS

Corrosion mechanisms are varied, complicated and largely dependent upon conditions of environment. Each problem should be analyzed individually, taking into consideration the factors suggested here. Question of reversal between steel and zinc is also discussed

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Committee on Steel Pipe Research
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MOST metals have an inherent tendency to change to more stable compounds. These compounds are likely to be the same as in the ore from which the metal was obtained. The degree and rate of change—corrosion—depend upon the environment and conditions that may develop, such as film formation, which may stifle the continuation of the initial rate of attack. Environment may accelerate or suppress corrosive action. *The Corrosion Handbook*, a publication of the Electrochemical Society, defines corrosion as "Destruction of a metal by chemical or electrochemical reaction with its environment." Environment is therefore an important factor which should be considered in the selection and economical use of metals.

Because the iron Pillar of Delhi in India has been preserved for centuries, it does not follow that it would have endured exposure to the atmospheres of industrial communities with occasional wetting by rain and dew. In fact, samples of ancient irons which have been exposed to moist industrial atmospheres behave very much like present-day materials. The illustration is often used of a piece of copper pipe embedded in something resembling concrete that is believed to be over 5500 years old. It was found by archaeologists in the pyramid of an Egyptian Pharaoh. Again this is no indication that it would convey some of the water encountered, for instance, on Long Island without deterioration in a relatively short time.

Similarly, a recent news item in one of the plumbing trade papers refers to a fountain in the courtyard of a restored villa in Pompeii to which the water was carried by lead pipe laid by the Romans more 2000 year ago. This is no criterion of the service of lead in distilled or very soft water carrying plenty of dissolved oxygen and carbon dioxide.

Classes of Corrosion — Corrosion can be divided into these classifications, depending upon the nature

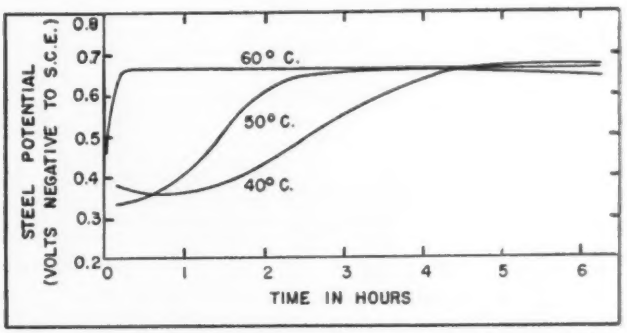

Fig. 1—Effect of temperatures on steel potential

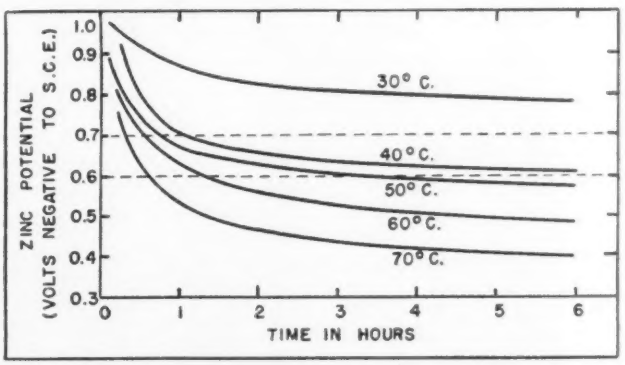

Fig. 2—Effect of temperatures on zinc potential, in solution containing bicarbonate, sulphate and nitrate

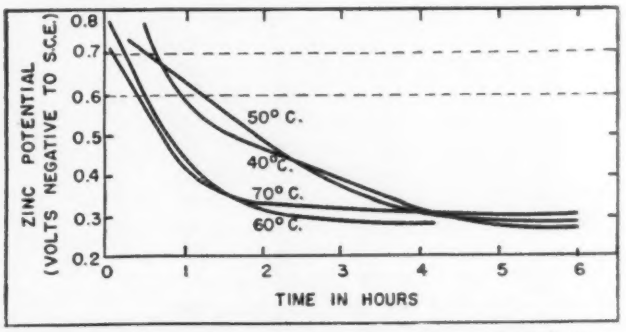

Fig. 3—Effect of temperatures on zinc potential in solution without sulphate

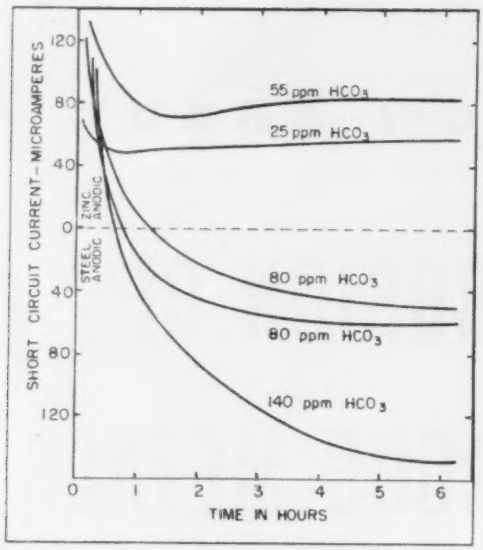

Fig. 4—Effect of bicarbonate

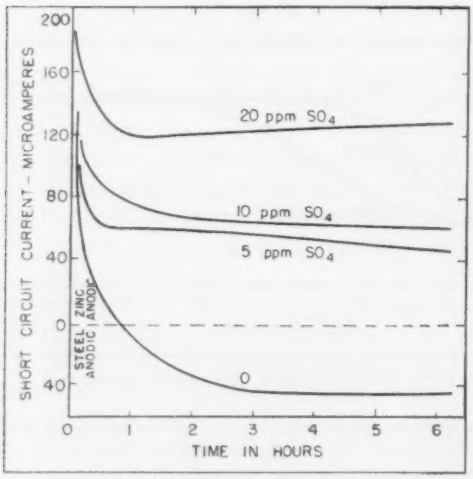

Fig. 5—Effect of sulphate

of surrounding media: 1. Atmospheric, 2. bacterial, 3. chemical, 4. high temperature oxidation, 5. soil, 6. stray current electrolysis, 7. underwater.

Atmospheric Corrosion—Nature of the atmosphere varies as to locality, such as rural atmospheres, industrial atmospheres in which gases and solids are encountered, marine atmospheres in which ocean salts are present, and atmospheres in space where processing is done, such as the pickling department of a steel plant. The variation in the amount of moisture is also an important factor and, together with the type of atmosphere, largely determines the corrosive action.

Among the steps taken when necessary to mitigate the atmospheric corrosive action on steel are alloying and use of coatings. Increased resistance due to the addition of small amounts of copper to mild steel is recognized in such environments. Use of special alloy steels may be indicated under certain conditions. Formation of protective films is important. Use of

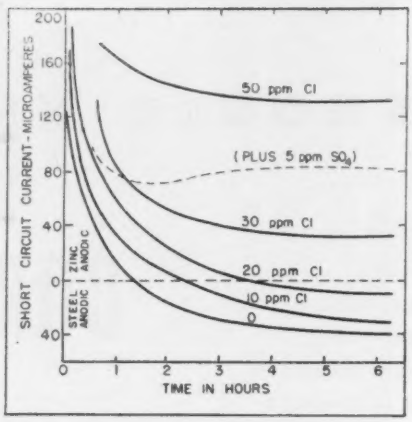

Fig. 6—Effect of chloride

metallic coatings such as zinc or nonmetallic materials such as paints, plastics or even grease, may be helpful, depending upon the exact nature of the environment.

Proper preparation of the surface before the application of both metallic and nonmetallic coatings is necessary for desirable results, as are proper techniques in application, the proper type of coating, and the thickness of the coating. Care should be taken to avoid damage to coatings before or during installation.

Bacterial Corrosion—Bacterial corrosion is the result of effects produced in the life cycle of bacteria. These micro-organisms are numerous and vary due to such conditions as the presence or absence of oxygen, iron or other substances present in solution or solid form in soils and waters. The organisms do not attack metallic iron, but cause trouble indirectly, due to their life processes. The difficulty may be due to fouling or influence upon corrosive mechanisms. Fouling results from building up deposits in water lines. The influences on corrosive mechanisms may be due to effects upon protective films, depolarization or the formation of corrosive media. Growth of such organisms in water lines can be stopped by chlorination and in some cases by oxidation.

Chemical Corrosion—Chemical attack occurs in those environments where the metal is rapidly attacked; usually accompanied by the rapid evolution of molecular hydrogen, such as would occur by immersing a strip of steel in dilute sulphuric acid. Here is an illustration of the effect of environment due to the strength of an electrolyte. Full strength sulphuric acid is transported in large quantities in mild steel tank cars, but the diluted acid rapidly dissolves such steel. Chemical corrosion can be mitigated by use of materials able to withstand a particular chemical attack or use of proper inhibitors.

High Temperature Corrosion—High temperature oxidation can occur at sufficiently high temperatures in dry air due to the formation of scale. This type of corrosion has also been described as electrochemical, the scale acting as the electrolyte. Diffusion through the scale may be ionic and electronic. Factors affecting the rate of corrosion are composition of the metal, temperature and length of exposure to a certain temperature. Mitigation of such attack can be effected by selection of the proper metal and the control of atmospheres.

Soil Corrosion—Soil corrosion results from electrochemical action by contact with soil and varies due to conditions which are influenced by composition of the soil and amount of moisture present. Circular C-450 covers 25 years of work by the National Bureau of Standards. It is stated in the abstract of this publication that—"Results of the tests of ferrous materials given in this circular indicate that the commonly used ferrous pipe materials do not differ greatly in their resistance to soils and that their apparent relative merits are either accidental or dependent on soil conditions. Low-alloy ferrous materials lose weight more slowly than unalloyed ferrous materials, but are penetrated by corrosion as rapidly."

Protection to pipe lines is afforded by the application of coatings such as coal-tar enamel and asphalt. Very often wrapping is necessary to avoid injury to coatings by mechanical effects by the soil and to reduce damage during handling and installation. Instruments have been developed to reveal "holidays" or damage to coated materials so that they may be properly repaired. Cathodic protection by the use of expendable anodes or direct current supplied by rectifiers to furnish current sufficient to keep the material in a cathodic state is a relatively recent development.

Stray Current Electrolysis—Stray current electrolysis causes perforation of a pipe line when a direct electrical current leaves the line to the ground. This has been overcome to a large extent by proper bonding of lines carrying electric current. This prevents leakage to such pipe lines and later to the environment. Use of insulating couplings or similar devices eliminates the carrying of these stray currents by the pipe line.

Underwater Corrosion—Natural waters vary, due to mineral composition and dissolved gas content

From data presented before the sixth regional technical meeting, American Iron & Steel Institute, San Francisco, Nov. 10, 1949.

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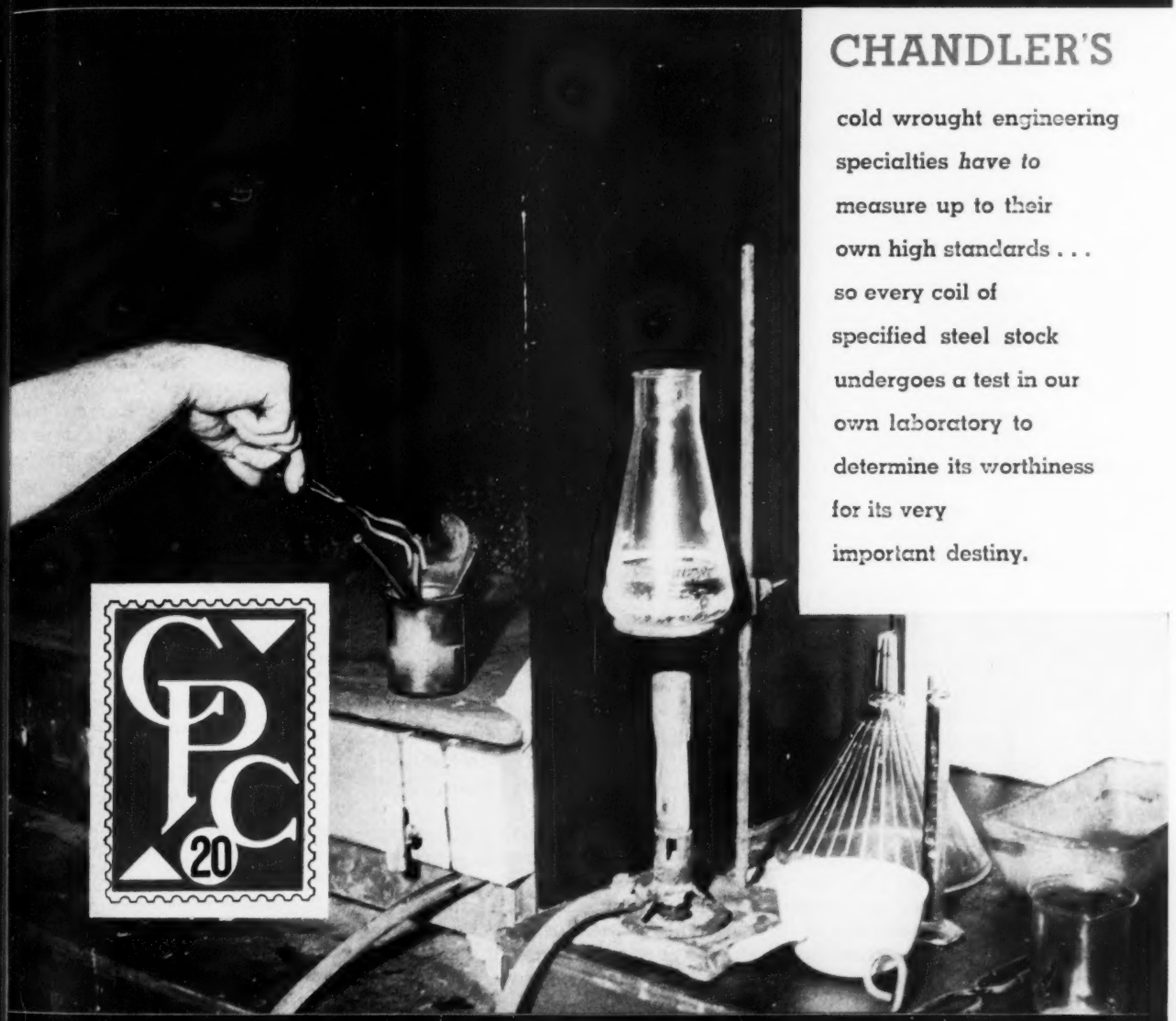

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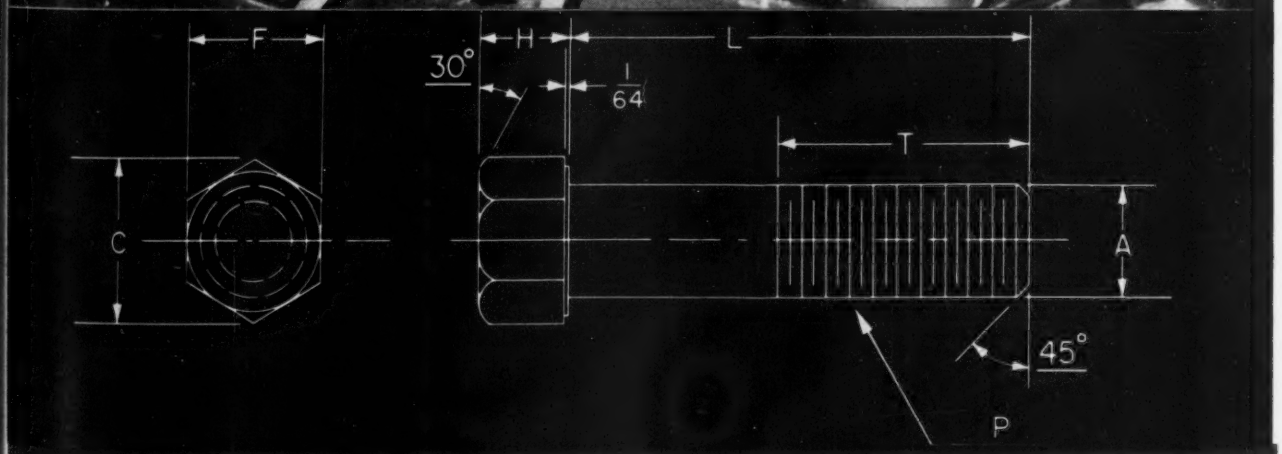

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Their effect on metal depends upon these factors: Temperature at which they are used, rate of flow, pressure in the system, and formation of protective films. Very soft waters high in dissolved oxygen and carbon dioxide are considered as aggressive waters. Waters with sufficient alkalinity and hardness to deposit a carbonate film are usually noncorrosive. Consequently, waters with a positive Langelier index at the temperatures at which they are used are generally not troublesome. Waters of this type that are softened by base exchange mechanisms may become aggressive.

It is recognized that the rate of corrosion varies with increase in temperature of natural waters, and research work done using Cleveland tap water, for instance, shows that within a range of temperature from 80 to 180° F the electrical conductivity of such water is a straight line function of the temperature. The control of temperature in hot-water systems to limit the water temperature to a maximum of 140° F helps to control corrosive attack.

In aggressive waters, lack of a deposited protective film may result in tuberculation and decrease in the rate of flow and at times discoloration of fixtures and laundry due to the iron oxide formed. In the case of brass and copper, greenish discolorations often are encountered. To overcome such difficulties, the use of inhibitors such as silicates and polyphosphates has been advanced. Some advocates claim that they provide a thin gelatinous colloidal film that may be almost invisible, and that negatively charged miscelles are attracted to anodic areas and start the formation of a film to protect the metal. Our observations indicate that the mechanisms may be physical in nature and in the case of silicates may depend upon cementing the products of corrosion or other substances in the water.

Mineral content of the water may also influence the nature of the film deposited and rate at which it is laid down. In very soft waters, there is evidence that appreciable tuberculation and the corresponding pitting occurs intially and that the products of corrosion are eventually formed and bonded to produce a protective film. There is also evidence that high temperatures influence adversely the formation of such protective films.

Reversal Between Steel and Zinc—Question of a reversal in position between zinc and steel from that ordinarily shown in the electrochemical series, prompted the Committee on Steel Pipe Research to engage in a fundamental study of the factors affecting the corrosion of galvanized steel pipe by domestic waters at Case Institute of Technology. The program was designed to determine the causes of exceptions to the usual long life of galvanized steel pipe in corrosive natural waters and to find means of overcoming this trouble. Ordinarily galvanizing affords protection by galvanic action, but some exceptional cases have been reported in which pitting was encountered, apparently due to a change in the usually accepted relationship between the two metals. Other investigators have reported a reversal of potential in the zinc/iron couple, attributing the cause to temperature.

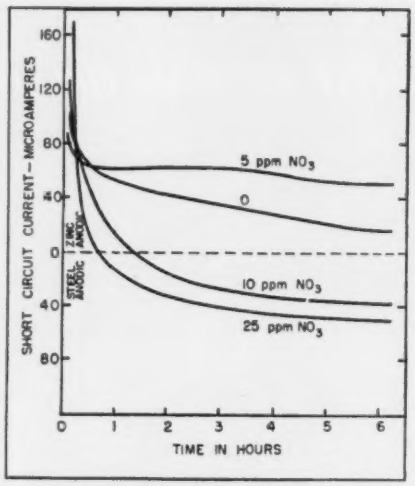

Fig. 7—Effect of nitrate

In R. B. Hoxeng's and C. F. Prutton's paper which represents a progress report on the subject, presented at the annual conference of the National Association of Corrosion Engineers at Cincinnati, April 13, 1949, these facts were reported:

1. Composition of water, as well as temperature, is a factor.
2. Sulphates and chlorides tend to prevent reversal, while bicarbonates and nitrates are favorable to a reversal.
3. Steel maintains a steady potential level under the various conditions of water composition and temperature.
4. Potential level of zinc may become more cathodic under certain conditions resulting in a reversal. The ennoblement of the zinc is likely due to film formation on its surface.
5. No reversal of the couple was found in the absence of oxygen in the water.

Charts drawn from data in various experiments show the effect of temperature and composition of the solution on steel and zinc electrodes, as compared with saturated calomel electrodes used as reference electrodes for all potential measurements, and for potentials between the zinc/steel couple. Sodium salts were added to distilled water to get the desired composition of the solution.

Fig. 1 shows the effect of temperature on the steel potential in a solution containing 140 ppm. bicarbonate, 10 ppm. sulphate, and 10 ppm. nitrate. This is typical for all types of solutions and demonstrates that steel has a relatively constant potential level under various conditions of temperature and water composition.

Fig. 2 shows the effect of temperature on the zinc potential in a solution containing 115-150 ppm. bicarbonate, 10 ppm. sulphate, and 10 ppm. nitrate. Composition of the solution affects the behavior of the zinc potential. Sulphates and chlorides tend to prevent reversal, while bicarbonates and nitrates are favorable to reversal. You will note the presence of sulphate in solution and amount of bicarbonates and nitrates.

Fig. 3 shows the effect of temperature on the zinc potential in a solution containing 35-45 ppm. bicarbonate and 5 ppm. nitrate, which are less than in the preceding solution and with no sulphate. Reversal is more pronounced.

Fig. 4 indicates the effect of bicarbonate concentration on short circuit current of zinc/steel couples at 60 C in a solution containing 10 ppm. suphate and 10 ppm. nitrate. Increasing bicarbonate promotes reversal.

Fig. 5 shows the effect of sulphate concentration on short circuit current of zinc/steel couples at 60 C in a solution containing 50-55 ppm. bicarbonate and 5 ppm. nitrate. Increase in sulphate tends to prevent reversal.

Fig. 6 shows the effect of chloride concentration on short circuit current of zinc/steel couples at 60 C in a solution containing 40-50 ppm. bicarbonate, 5 ppm. sulphate, and 10 ppm. nitrate. The broken curve is for a solution containing a total of 10 ppm. sulphate but no chloride, indicating the greater effectiveness of sulphates in preventing revesal.

Fig. 7 indicates the effect of nitrate concentration on short circuit current of zinc/steel couples at 60 C in a solution containing 40-55 ppm. bicarbonate and 5 ppm. suphate.

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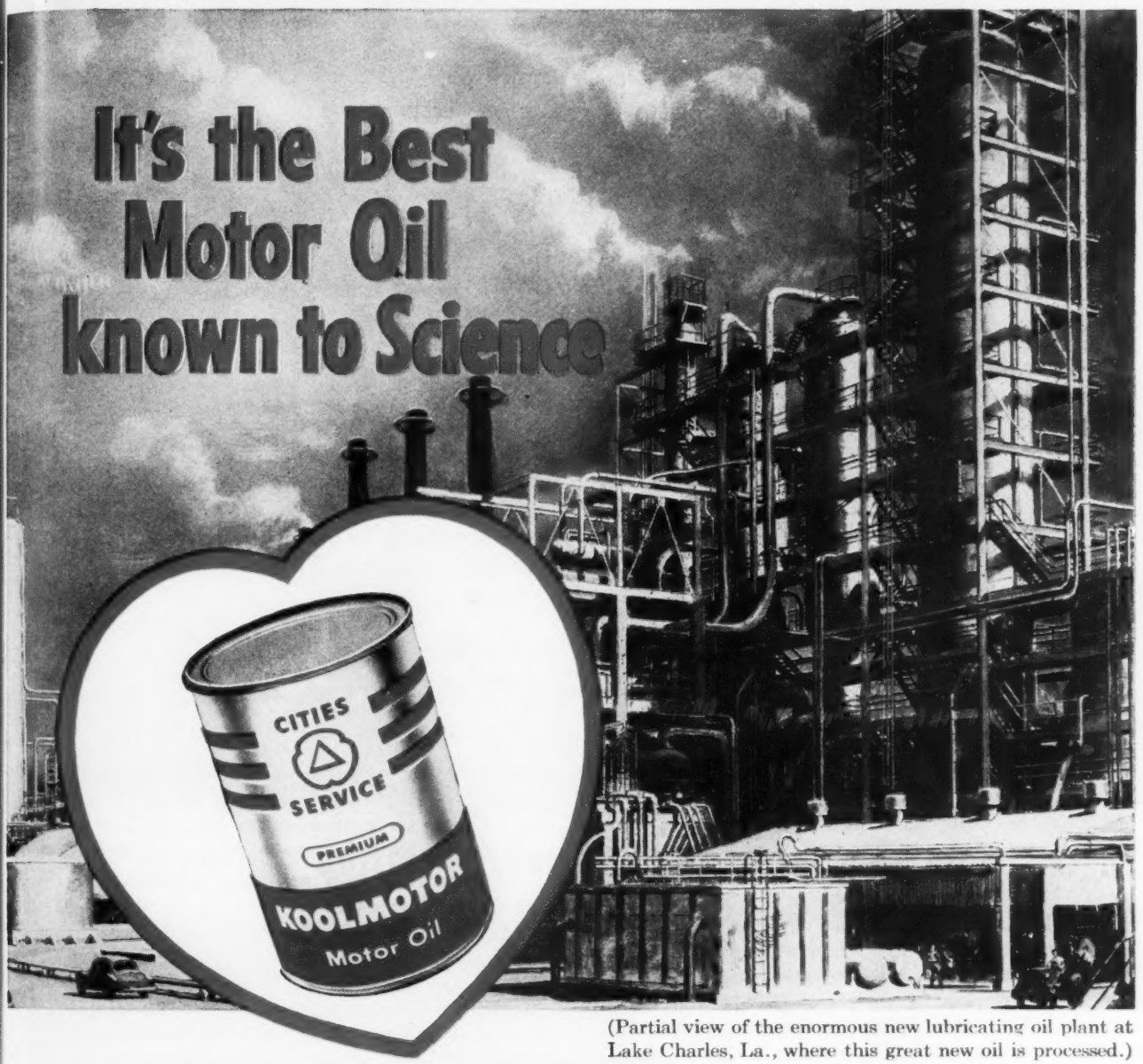
3. "Electrochemical Behavior of Zinc and Steel in Aqueous Media," by R. B. Hoxeng, research associate, Case Institute of Technology and C. F. Prutton of Carl F. Prutton and Associates, both of Cleveland.



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Production of FORGINGS

Shaping of metal by forging, as an art, has been in existence for many centuries. Historical records indicate it was known long before the advent of the Christian era when many products, both for peace and war, were produced by skilled smiths who subsequently passed on their knowledge to their sons

By WALDEMAR NAUJOKS
Special Projects Engineer
Ladish Co.
Cudahy, Wis.

PART I

FORGINGS are metal parts which have been given their shape by hammering or pressing a short length of bar into the shape of the finished piece, after the material has been heated to a high temperature to render the metal plastic to hot working. A large portion of present day metal compositions or alloys become plastic at some elevated temperature, and metal worked at that temperature can be shaped without damaging metal strength. As a matter of fact, metal worked at its plastic temperature, commonly called "forging temperature", acquires improved physical properties because of the forging it has received.

In the forge man's language, plastic metal is "flowed" to a new shape by use of forging pressure, either impact pressure as given by a hammer, or push pressure as rendered by a press. Forging pressure causes the heated plastic metal to flow in a manner similar to that of putty being squeezed by hand.

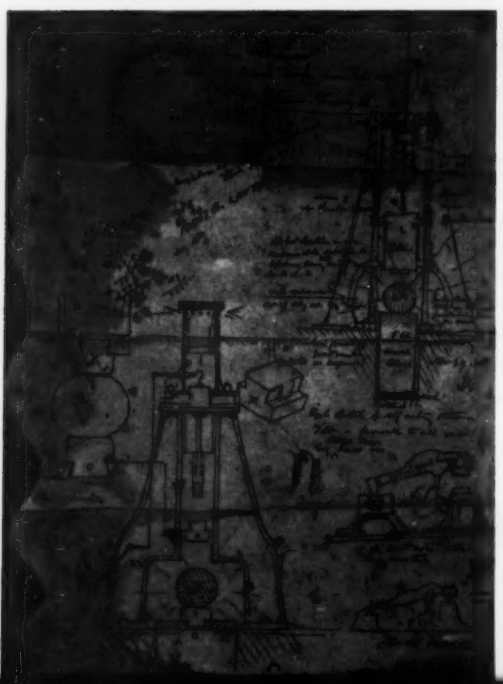

Fig. 1 — First drawing of a steam hammer, produced on Nov. 24, 1839, by James Nasmyth

In general, impact pressure, or hammering, is an intermittent pressure where metal flow is kept going by a series of blows, and in push pressure, the amount of movement desired for a given forging step is accomplished in one push. While results are the same, there is a difference between impact pressure as delivered by a forging hammer and push pressure as imparted by a forging press. It can be seen that as a hammer blow descends, the maximum amount of striking energy is available at the instant the striking die face touches the hot metal. As hot metal spreads out, energy in the striking die and ram is absorbed to a point where the ram and die stop for an instant before they move upward to get ready to strike the next blow.

Conditions are reversed in the forging press. At the instant the die and press slide are in contact with the hot metal, there is little energy in the push but the pressure builds up until it reaches its maximum at the bottom of the press stroke. This difference between the two types of forging pressure is given to indicate that skill and experience are necessary in the use of proper forging tools, as well as in correct heating and other important factors that enter into the manufacture of good forgings. Modern metallurgical science has played an important role in development of the many forgeable alloys for meeting diversified requirements, and present day engineering has kept apace by building equipment with ability to process both small and large sizes in a large variety of forging compositions.

Shaping of metals by forging, as an art, has been

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in existence for many centuries. Historical records indicate that forging of metal was known long before the Christian era. Skilled smiths, who received their knowledge from their fathers—subsequently passing it down to their sons, forged many products. In times of war they forged swords, spears, armor pikes, and allied equipment. During peace time they forged intricate wrought fences, plow shares, and a large assortment of hand tools for domestic use.

Early forging art demanded good physical strength as well as forging skill. Heavy metal pieces were placed on anvils and struck with heavy hand sledges to develop the desired shapes. Advent of the water power hammer eased the manpower necessary for striking but increased the difficulties in handling larger pieces. Porter bars, crude cranes and hoists were used. The water power hammer resembled a large hand hammer with one end fastened to a pivot so the striking end could be raised by a rotating cam and then dropped to strike its blow. Records indicate that the largest water power hammers had a falling weight of about 1000 pounds that they dropped from two or three feet. Use of dies in hammers for forging duplicate parts originated about a century ago when crude rough shapes were gouged into the hammer dies. Our American Civil War was instrumental in a more rapid development of impression dies by demanding a quicker way of producing rifle and pistol parts with attendant reduction of amount of machine and hand work necessary. Impression dies for production forging work are made to very close tolerances today.

Hot working of metals is divided, usually, into two general classifications, that of hot rolling as performed in steel rolling mills, and that of hot forgings, as done in a forging plant. Forging is always understood to be hot forging unless stated otherwise. Hot working of metal, either by rolling or forging, imparts a fibrous structure in the metal in the direction of working. This fibrous structure, which can be seen in a piece of metal after being properly etched, is called by one of several terms such as "fiber structure", "grain flow" or "flow lines". This fiber structure in wrought metals has been found to be the basic source of great strength and resistance to stresses. With proper skill and care in heating and forging, the basic strength can be improved; conversely, improper heating or working will tend to reduce basic natural strength.

The normal custom has been to classify forgings according to the method by which they are produced, and by such a classification, there are four general groups; (1) smith forgings, (2) drop forgings, (3) forging machine forgings (upsetter forgings), and (4) press forgings. Smith forgings, are made by working stock under flat dies, perhaps supplemented with loose portable tooling. Final approximate shape depends largely upon the hammersmith's skill in positioning and maneuvering the piece under the hammer while it is being forged. The other three methods

Waldemar (Wally) Naujoks was born in Milwaukee, and acquired the rudiments of forging and machining practice at an early age in his father's tool forging shop. Completing apprenticeship as toolsmith and machinist, he entered the U. S. Navy in 1917. In 1919 he was employed at the Milwaukee Works of the Illinois Steel Co. but left in 1920 to enter the University of Wisconsin. After three years he withdrew to become machine shop instructor at Morton High School, Cicero, Ill. Re-entering Wisconsin in 1925, he graduated with a B. S. degree in mechanical engineering in 1926. Subsequently he acquired a M. S. degree in metallurgical engineering and the degree of mechanical engineer.

A year was spent in the employ of Ladish Drop Forge Co., Cudahy, Wis. and in 1928 he joined the Steel Improvement & Forge Co., Cleveland, O., as mechanical engineer and was promoted to chief engineer in 1935. He resigned his position at the end of 1946 to consider business partnership in Buffalo, N. Y. In July, 1947 he joined the Ohio Injector Co., Wadsworth, O., as manager of the new forged valve division. Later he joined Girard Associates, Chambersburg, Pa., an organization of forging engineers and consultants. At the present time he is a special projects engineer at Ladish Co., Cudahy.

He is considered an outstanding authority on forging practice and has been active in writing and lecturing. His "Forging Handbook" has been accepted as an outstanding contribution in the metalworking industry. He is past chairman of Cleveland chapter, ASTM, and presently active in the newly formed Akron Chapter. He is also a member of the American Society of Mechanical Engineers, Cleveland Engineering Society, and Army Ordnance Association.

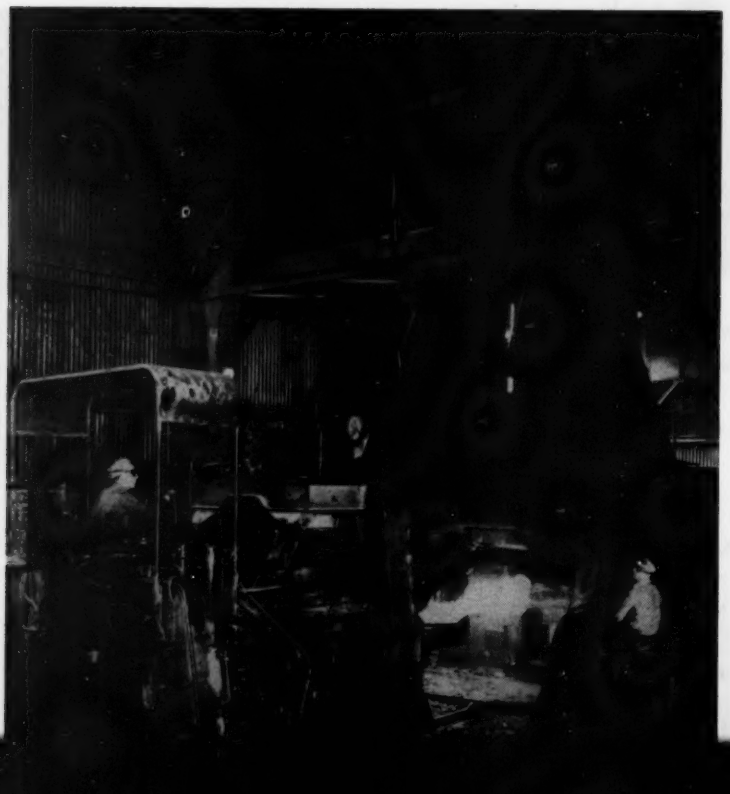

Fig. 2—Double-frame steam forging hammer of 16,000-pound size. Note the floor manipulator handling hot stock under hammer dies

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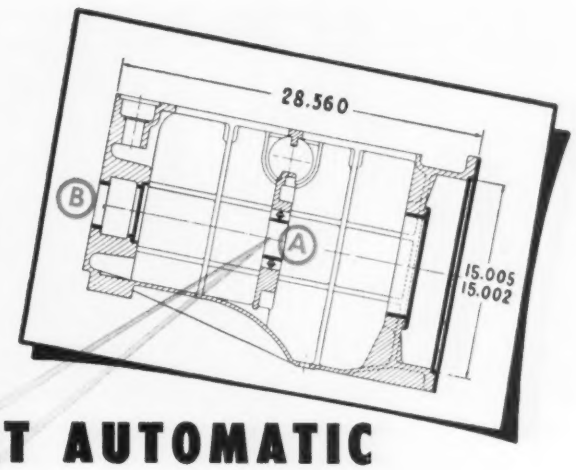
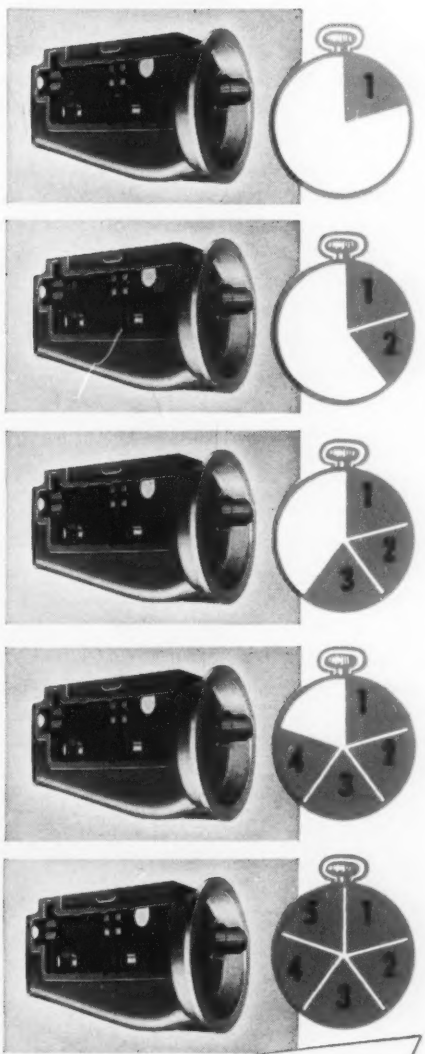


23 operations on this Crankcase are indicated by the heavy lines in the drawing — all precision-machined *in one holding* on the P&J 8DXT. The smaller size of the middle bore "A", in relation to the back bore "B", presented a problem. Skillful P&J Tooling solved it, and delivered excellent productivity by completing the job at the rate of one *Crankcase every 12 minutes* at 85% efficiency.



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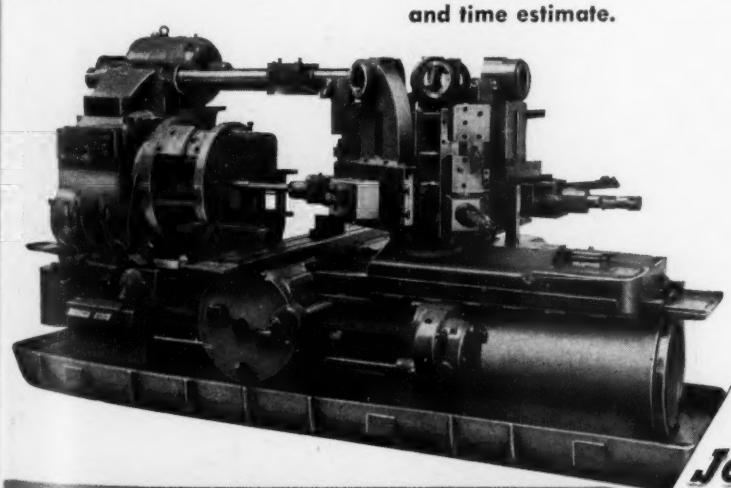

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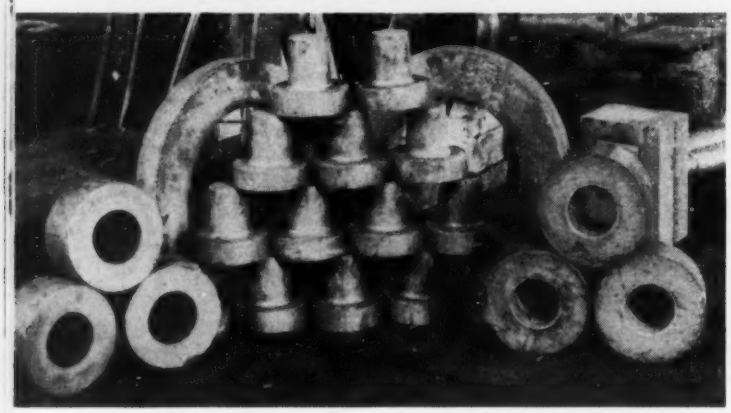

Fig. 3—Hub and ring forgings are typical examples of smith forgings

make use of special impression dies to obtain forgings which are commercial duplicates with each other. Impression dies are used where quantities are sufficient to warrant the cost of making necessary impression dies and other tooling.

Smith forging, where metal is maneuvered under flat dies during the forging operation, makes use of techniques developed throughout the centuries for making forged parts. Forgings made by this technique are known also as hand forgings, hammered forgings, flat die forgings, flat hammer forgings, and blacksmith forgings. Present day use of smith forgings is made where small quantities do not justify the cost of the impression dies, where sample parts are desired for experimental and testing purposes before proceeding with production tooling, or where sections are too large or irregular so as to make impression dies impractical. In present day smith forging practice, a large variety of shapes can be made with modern techniques and knowledge. In general, smith forgings cannot be held to sizes as close as those obtained from impression dies, nor can all shapes be produced in the same detail. Experience and skill of the hammersmith is an important factor in the manufacture of smith forgings, where reasonable shapes and sizes are desired. Some smiths have the skill and patience to make smith forgings of remarkable accuracy, but generally it is more economical to do a little more machining than to add additional forging time for close smith sizing. Picture of smith forging hammer is shown in Fig. 2.

Smith forgings range in size or weight from very small hand chisels weighing a few ounces, to the largest smith forgings weighing over 100 tons each. Some principal products of the smith forging art are weldless forged rings in an almost unlimited variety of sizes and shapes and weights, chisels and hammers, bars, stems, flanges, cranks, crankshafts, large valve blanks, tappers, bucket teeth, large hexagon and square nut blanks, arms, and many other items. The smith forging hammer and smith forging press also find present day use in working down a considerable tonnage of cast ingots into square and flat bar stock, particularly on tool steels, high speed steels, and some types of stainless steels. Fig. 3 shows some different types of smith forgings.

Hammer type of forging equipment is rated for size by the weight of its striking parts. In general, the striking head, into which the top striking die is fitted, is termed the ram, and the hammer ram contains nearly all of the striking weight. The weight of the die is not included in rating, and when a forging hammer is classed as a 500 pound hammer, weight of the striking ram is the main consideration.

Helve and trip forging hammers represent the smallest power forging units for general smith forging work. These small power hammers range in size from a small 15 pound unit for making and dressing chisels to the 500 pound size used for general smith forging work within its range. Helve and power hammers strike rapid blows, with speeds of about 150 blows a minute for the larger units to speeds of about 500 blows for the little fellows. The helve and trip hammers are usually operated by means of a foot treadle which is connected to suitable clutch mechanism. Fig. 4 shows a typical helve or trip hammer. Helve power hammers are used, also, in conjunction with drop hammers to make some types of drop forgings.

Pneumatic forging hammers operate on compressed air, with the air compressor and electric motor being contained in the hammer frame. Speed and power of the forging blow is regulated by means of a foot treadle on small sizes and by the use of hand controls on large sizes. Where hand controls are used,

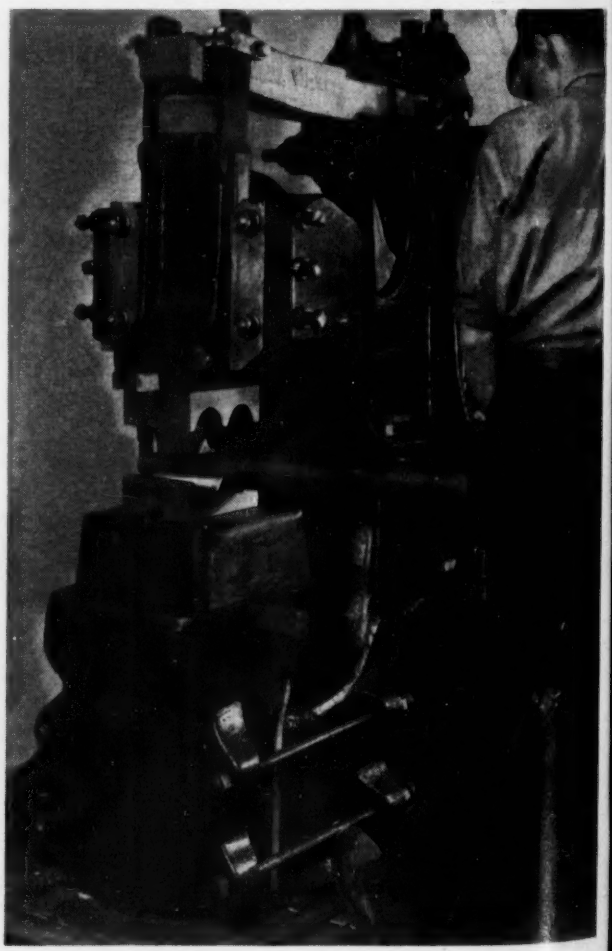

Fig. 4—Helve or power hammer—150-pound unit being used to swage down tubing

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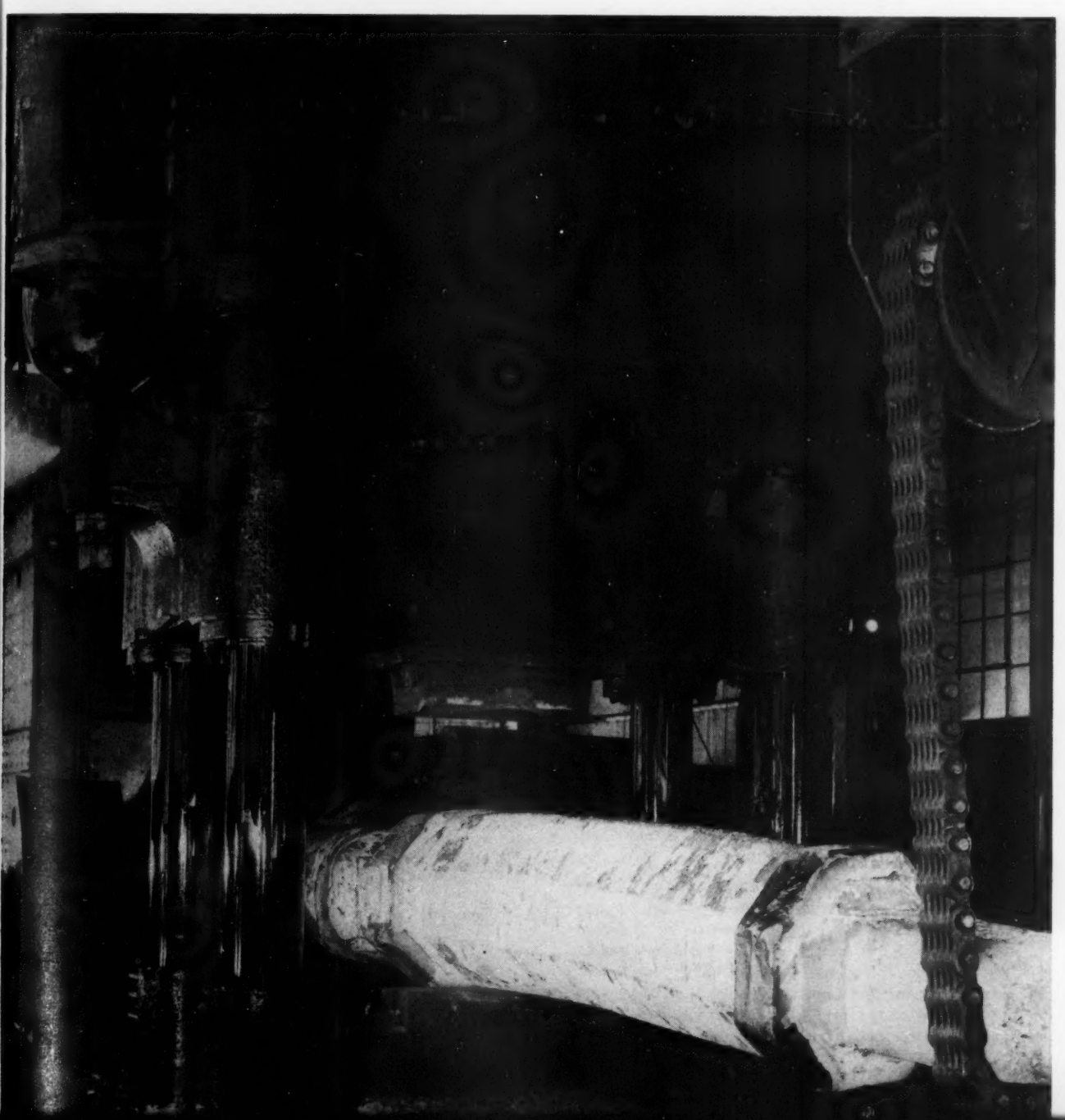
a hammer driver takes care of the hammer operation and a hammersmith manipulates the work under the hammer. Speed of forging blows is dependent upon forging requirements and can be regulated from very slow blows to about 100 blows a minute. Pneumatic forging hammers normally range in size from about 200 to 3000 pounds.

Steam forging hamers for smith forging work are operated on steam pressure of about 90 to 100 pounds. They can also be operated on air pressure where minor changes are made to the valve mechanism and the piston is fitted for air pressure use. Where compressed air is used, operating pressures average about 10 pounds lower than the steam pressure. Operation of steam forging hammers is usually manual, with the hammer driver operating two control levers to deliver the blows with the speed and intensity desired by the hammersmith. Blows can be regulated so as to deliver an easy slow blow up to a hard full-powered blow, and at slow or rapid intervals. Steam forging hammers are built in two designs, the single frame hammer where the frame is in the shape of a letter "C", and the double frame forging hammer where two supporting frames are used, one on each side. Single frame type permits greater movement around the hammer for forging work and is useful in forging wide irregular shapes, but perhaps is considered less rigid than the double frame type. Single frame steam forging hammers are made in normal sizes from 200 to about 6000 pounds. Double frame steam forging hammers normally are made in sizes from 1000 to 25,000 pounds. Single frame types are used for general smith forging work. Larger sizes of the double frame type are used extensively for making large shafts, crankshafts, pinions, and for cogging down ingots to billet and bar sizes. Heavy forgings are handled by power floor manipulators, or by manipulators attached to overhead cranes. Fig. 5 shows a typical steam forging hammer.

Fig. 5—Seventy ton ingot being forged in a 3000-ton steam hydraulic forging press



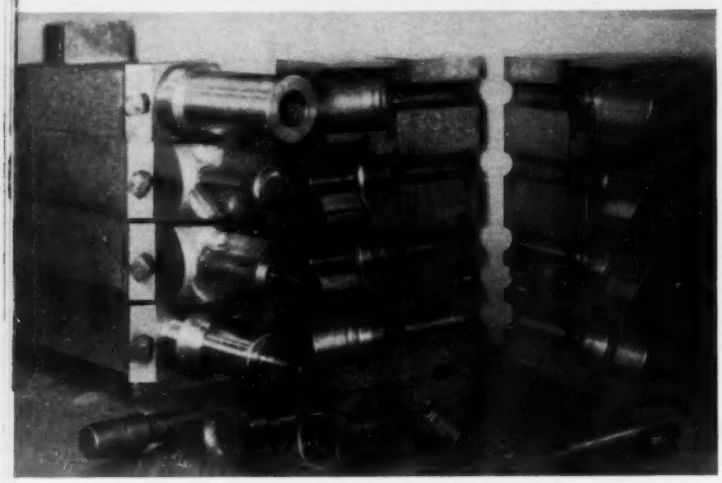


Fig. 6 — Forging machine dies used to produce flanged hub forgings. Various steps as shown below from left to right are forged in successive steps from top step on dies down in four steps

The largest smith forgings are usually made under large forging presses. Smith forging presses are normally of the hydraulic type, either being steam or motor driven. Forging presses are rated for size by the forging pressure they exert, rating being in tons of maximum pressure. Smith forging presses range in size from about 500 to 20,000 tons. The largest commercial forging presses regularly produce forgings weighing over 100 tons each, and forgings have been made weighing over 200 tons each. A 200 ton disk forging would be a solid piece of steel with dimensions over 10 feet in diameter and 10 feet high. Smith forging presses are designed to provide ample clearance for large forgings.

Impression die forgings are forgings made to the shape contained in the finishing cavity, or impression. Use of the word "impression" for the die cavities is taken probably from impressions used in striking coins. Impression dies generally contain several forging steps to control the flow of the metal and to develop the final shape. The several forging steps are machined into a pair of die blocks when they are made for drop hammer use, part of the impressions being in the top striking die and part in the bottom stationary die. Fig. 6 shows dies of this type. Forging machine impression dies consist of a pair of blocks which contain the necessary forging impressions and which are also designed to tightly grip the forging stock, and a set of header punches which are used to push hot metal into the die cavities. Impression dies for the forging press may consist of a pair of blocks similar to the set used for drop forging, or they may consist of one or several blocks for the lower stationary die and punches for the movable top die.

It is known that when forging pressure is exerted on hot plastic metal it tends to spread out in directions of least resistance. Where it is desired that metal flow to a greater degree in one direction than in another, the preliminary forging steps are designed to place suitable obstructions where lesser flow is desired. Preliminary forging steps include the edging impression or edger which is designed to proportion cross-sectional areas throughout the length of the forging stock for further forging; the fullering impression or fuller, which is used to reduce the center cross-sectional area while leaving both ends with the original sizes; the bender which is used to bend edged stock into the general shape of the final forging; and the blocking impression which is a die cavity approximating the final forging shape. Finishing, or final, impression contains the exact size and shape of the finished forging. For small and medium sized forgings, it is possible usually to contain all forging steps in one set of drop forging blocks. Large drop forgings may require two or more sets of forging dies to contain the necessary forging steps. Two or more sets of impression dies may be necessary where different types of forging units are needed to produce a desired forging, as for example, a given forging may require the use of both a drop hammer and forging machine. Not all forging plants contain all sizes and types of forging equipment so design of forging dies depends upon the

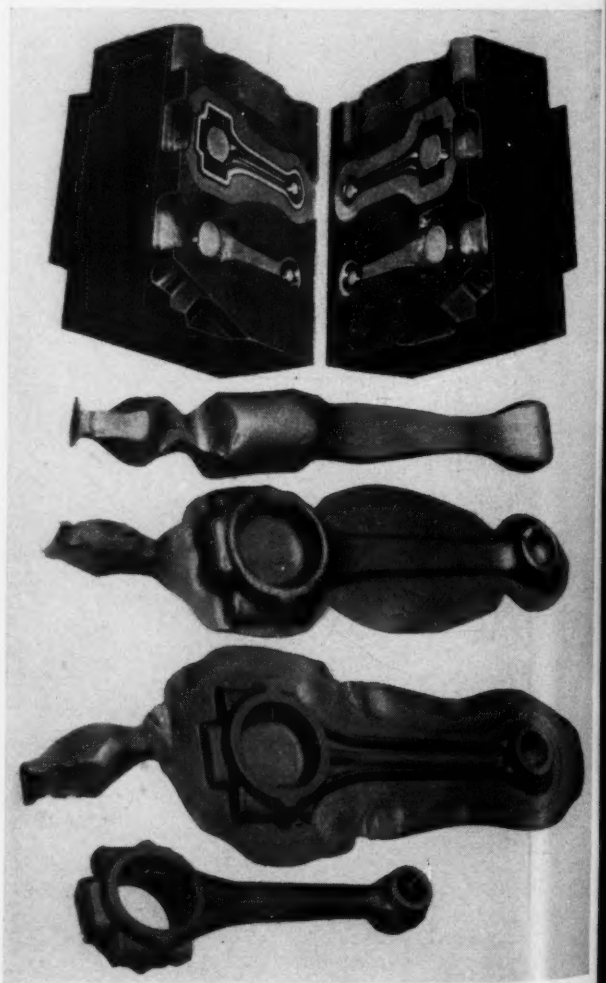


Fig. 7—Set of typical connecting rod dies showing the several forging steps. Second photo shows shape of forging stock after being worked in the fuller (lower right hand corner of die); third, after blocking (left connecting rod shape in die); fourth, after forging in the finishing impression (right hand connecting rod shape in die) and fifth shows forging after being trimmed and punched

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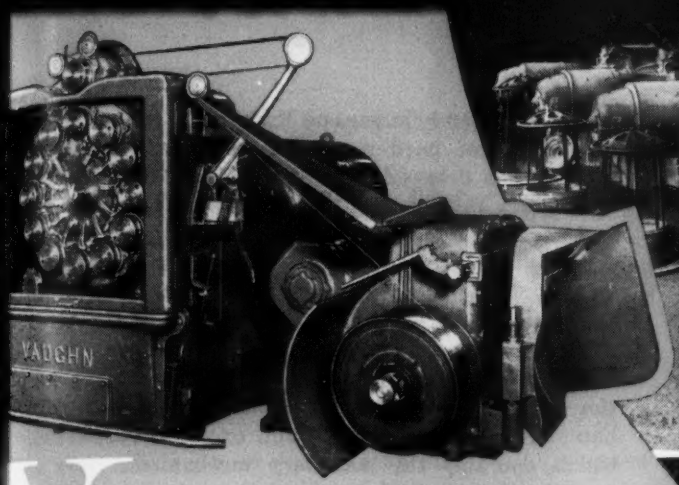

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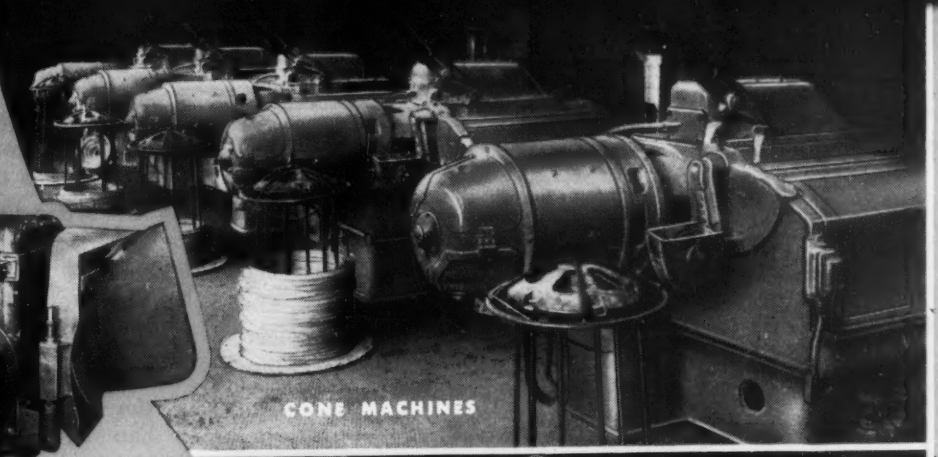

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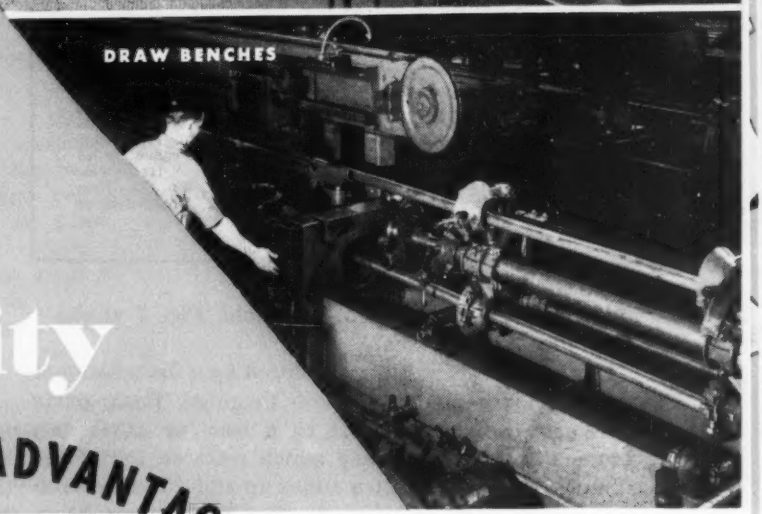

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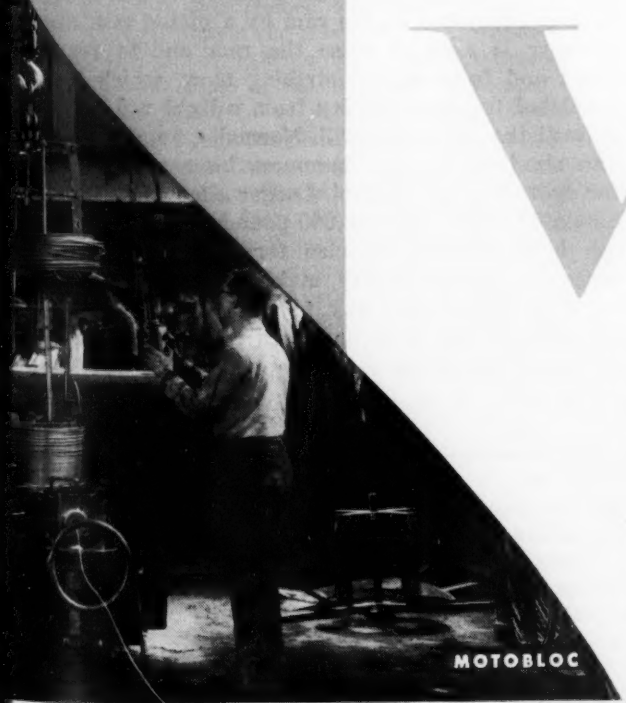

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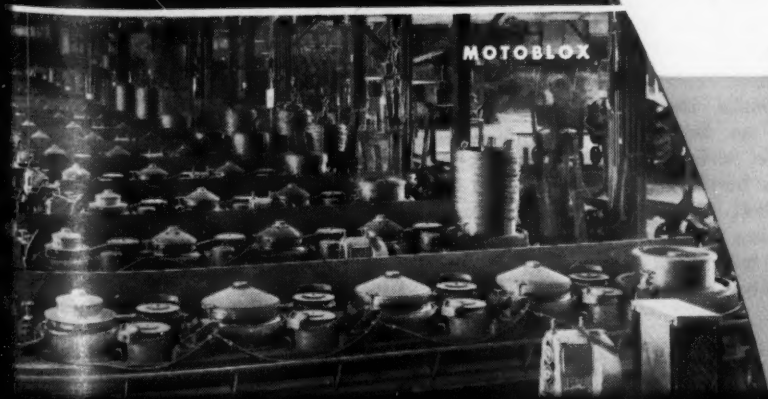

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REPRINTS of previous individual chapters in the series "Fundamentals of Steelmaking" now may be obtained by addressing Readers' Service Department, STEEL, 1213 W. Third St., Cleveland 13, O. Prices range from 20 to 75 cents per reprint. Subjects covered over the past few months include:

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type of forging equipment available. Fig. 7 shows a set of drop forging dies.

Impression die forgings produced by a drop hammer are commonly known as drop forgings. Basic parts of a drop hammer consist of a base or anvil, two columns or frames, a head which rests on top of the columns, and a ram which slides up and down between the frames and delivers the impact forging blow. Normal drop hammer design is to make the anvil weight from twenty to twenty-five times heavier than weight of the striking ram. Drop forging dies are fastened to the ram and anvil by means of dovetail type of shanks with long tapered keys being used to tighten the dies into position. A protective steel cap, usually called the "sowblock" is placed between the anvil and bottom die to prevent undue wear on the anvil. Striking is performed by the top die.

Drop hammers generally used for drop forging production are of two types, one a gravity type where the ram has a free fall to strike the blow, and the other, a steam drop hammer where steam pressure against a piston adds to the free fall of the ram to produce the forging pressure.

The board drop hammer is the most common type of gravity drop hammer and the name is given because of the use of hard maple boards to raise the ram after it has dropped to strike a blow. Bottom of the boards are fastened into a slot at the top of the ram and top of the boards pass through a set of rolls. At the bottom of the stroke the rolls move together against the boards with sufficient pressure to lift the ram and die by rolling. At the top of the stroke rolls spread apart again, releasing the boards to permit another blow, or a set of holding clamps keep the ram in top position. Operation of a board drop hammer is carried out through use of a foot treadle which operates the necessary mechanism. Very recent developments in gravity drop hammer design have brought out a type which substitutes an air cylinder in place of the boards to raise the ram. The fall remains a gravity drop. Important features appear to be an increase in blows per minute and elimination of constant board changes. Drop hammers, in common with all forging hammers, are rated for size by weight of the moving parts which are mainly the ram in gravity type drop hammers. Board drop hammers are built in sizes from about 200 to 7500 pounds. Average blows per minute are from about 50 to 70. All blows are of the same impact power, since it is not possible to strike light and hard blows at will in a gravity type of hammer.

Steam drop hammers have an appearance similar to gravity drop hammers, the main visible difference being in the head of the unit. A steam cylinder rests on top of the columns and a piston in the cylinder head is connected to the ram by a piston rod. Steam pressure is used to raise the ram and to regulate speed and force of the striking blow, which can be regulated to any intensity from a light tap to a full blow at the operator's will. Normally, small and medium sized steam drop hammers have a foot treadle for operation and control. Larger sizes of steam drop hammers, from about 16,000 pounds and over, usually use hand controls because forgings made in these units are long and bulky, making it desirable to have controls out of the way to permit better handling of stock. Steam drop hammers range in commercial sizes from about 400 to 75,000 pounds.

(To be continued)

Air Compressors Furnish Heat

WASTE heat from air compressors and their driving engines is being recovered and being put to use to supply heat for which coal, oil or gas would have to be burned in any standard heating system. Schramm Inc., West Chester, Pa., has three 315 cfm compressors, driven by diesel engines and a third by a spark-ignition engine, delivering about 400,000 Btu per hour into a system suitable for space or process heating.

Engine compressors are teamed with unit heaters. The engines are equipped with marine-type water-cooled manifolds, the water picking up the heat which would otherwise be exhausted into the atmosphere and wasted. The water is taken directly from discharge of the engine-compressor cooling system and circulated by the engine pump through the heating equipment. A control in the hook-up keeps the unit-heater fans from operating until the water reaches a preset minimum temperature.

For heat dissipation in the summer months, the water may be circulated as before, but the heater fans are reversed to discharge outside the building. The company reports that the cost of equipment and piping necessary to recover heat and put it to work is relatively small. Heat recovered is said to be 1250 Btu per hour per cubic foot per minute of compressor capacity at 100 psi.

Galvanized Wear Standard

MINIMUM requirements for material, workmanship and construction of articles of hot-dipped galvanized ware are presented in commercial standard CS161-49, standard grade hot-dipped galvanized ware (coated after fabrication), now available. Effective from Nov. 1, 1949, for new production, the standard, which may be obtained from National Bureau of Standards, Washington 25, D. C., also recommends weights per dozen for finished ware.

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High-Speed Camera Registers

Physical Reaction of IRONMAKING

What transpires in the bottom of a blast furnace long has baffled operators but the secret long held in the clutch of the hearth is about to be revealed by high-speed photography. Views reveal speed and size of particles opposite tuyeres

WHAT blast furnacemen long have desired to observe—the actual smelting operation inside the furnace near the "dead man", that column of seemingly cold material centrally located in the hearth zone—at last has been realized. Through the courtesy of the United States Steel Corp. four reels of high-speed motion pictures in color made by sighting the camera through a tuyere at hearth level were shown at the annual winter meeting of the Eastern States Blast Furnace & Coke Oven Association, William Penn Hotel, Pittsburgh, February 24.

The four reels taken at a speed of 2000 and 3000 frames a second show in slow motion the travel of incandescent particles of raw materials whose actual speed in the blast furnace is estimated to be as high as 135 miles per hour. The pictures were made from blast furnace operations at Edgar Thomson Works of Carnegie-Illinois Steel Corp., Pittsburgh, and at the Fairfield Works of Tennessee Coal, Iron & Railroad Co., Birmingham. Dr. J. B. Austin, director of research, United States Steel Corp., explained at the outset that the pictures were not conclusive; they were taken in an effort to master the technique before branching out on a larger program.

Reveals "Dead Man"—At one of the Edgar Thomson stacks with the blast pegged at 20 pounds and camera operating at 2000 frames per second through a tuyere opening of 7 inches diameter, every now and then the view opened up at the rear to show the "dead man" or chunk which has black cavities and begins to swim around in the molten bath. Chunks of material also are seen moving around in the liquid which is in a state of ebullition. Small black particles, which may be coke, also are in movement and from all appearances seem to burn in the blast in 1/100-second. The particles differ in the degree of brightness evidently due to the temperature.

At one of the Fairfield stacks where 20 pounds pressure was maintained and with the camera operating at 3000 frames per second and sighted through an 8-inch elliptical tuyere, the view showed more particles in ebullition than at the Edgar Thomson stack.

Penetrates Liquid Mass—An attempt was made to measure the vertical components of velocity of the particles and results indicate that medium-sized particles moved at a speed of about 10 feet per second. By taking a single frame in the film and counting the particles, it was found that at the Edgar Thomson stack the sizes were less than 1 inch whereas at the Fairfield stack the frequency was over 1½ inches. It was pointed out that the real problem is to identify the chunks which come into view as the liquid splashes and tosses around in front of the tuyere. The thicker pieces, it was pointed out, may be coke. The particles seem to be forced against the "dead man" by the blast and then take an upward course in the agitated liquid. The camera was able to penetrate the liquid mass for about 3 feet from the edge of the tuyere.

"Conveyorized" Tuyeres—George Steudel, consultant, A. J. Boynton & Co., Chicago, in speaking on "The Theory, Equipment and Operation of Lime Injection Through the Tuyeres of a Blast Furnace" asserted that while some heat is absorbed when flux is injected through the tuyeres yet the operation affords control of quality and perhaps a reduction of coke. He explained that on a 16-tuyere furnace individual screw conveyors are required to afford uniform distribution of the lime. Approximately 3000 cubic feet of air per minute is necessary to convey the lime from the injector chamber through the tuyeres into the furnace. The equipment required to carry out the process is amply protected in case of a furnace slip.

In commenting on this particular paper one operator was of the opinion that if adequate stove capacity is available, it seems plausible to calcine the limestone in the furnace. Others saw no point in this and they expressed their dislike in putting cold material in the furnace at this point because of the different temperatures encountered at the various tuyeres. One operator pointed out that you can inject fuel oil in the tuyere and close it. Question was raised as to whether lime injection at the tuyeres would have a sand blasting effect at that point and adjacent region but the author pointed out that the silica in the lime is the only element that would serve as a cutting agent and this element, he stated, is so low that little or no damage would be done.

Low assembly costs due to the mills being in close proximity to the mine, washing of low-grade coal, ore blending, and high blowing rate are some of the characteristics of southern blast furnace practice which were described by J. A. Maxwell, superintendent blast furnaces, Ensley Works, Tennessee Coal, Iron & Railroad Co., Birmingham. When we started crushing ores, the speaker stated, blast pressure increased from 3 to 5 pounds on the furnace; some days pressure ran up to 30 pounds. This necessitated the purchase of high-pressure blowers and when these were installed we were able to keep a constant volume of wind on the furnace and thus increase output.

Blast Checks Necessary—Mr. Maxwell directed attention to the fact that the blast on all basic furnaces in the south have to be checked because of high lime charge. Flue dust output amounts to 160 pounds per ton of iron under southern practice and the author pointed out that increased wind pressure does not increase the amount of flue dust made.

In describing practice using Brazilian iron ore crushed to 6 inches, Mr. Maxwell explained that when charged into the furnace without further preparation, it arrives at the bottom of the furnace in lumps. He went on to explain that when this grade of ore was crushed and blended with red ores in amounts of about 25 per cent, no difference in blast furnace operation was apparent.

All southern boshes are higher than those installed on northern furnaces. For instance, No. 1 Ensley has a bosh 13 feet 9 inches high; No. 3, 19 feet 1 inch; and No. 4, 19 feet 4 inches. Bosh angles range from 80 to 82 degrees. The speaker asserted that No. 7 furnace at the Fairfield works is the largest blast furnace in the world as far as total cubical capacity is concerned. This stack has a cubical content of 55,836 cubic feet.

FASTER SPEED OF *Autofeed* PRESS

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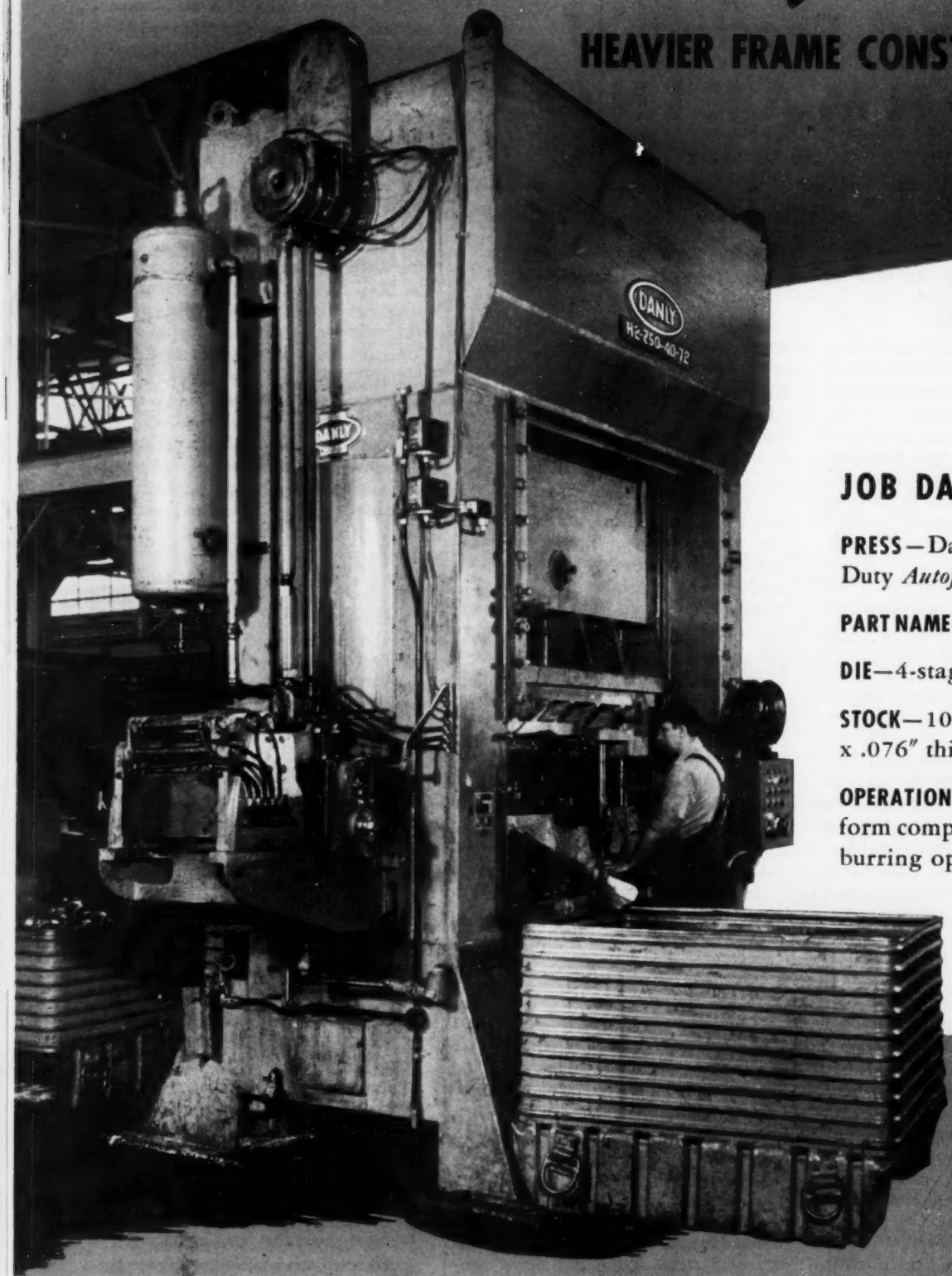

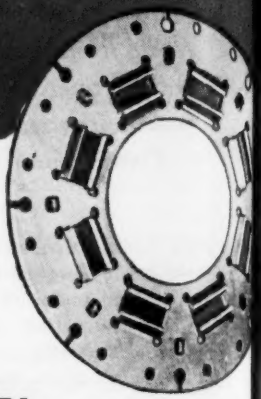

JOB DATA:

PRESS—Danly 250-ton Heavy Duty *Autofeed*

PART NAME—Clutch driven plate

DIE—4-stage progressive

STOCK—1020 CRS, 6⅛″ wide x .076″ thick, coil.

OPERATIONS—Blank, pierce and form complete. (No subsequent burring operation required)

This Danly 250-ton Heavy Duty Autofeed press produces both finished stampings shown on the inspection table (opposite page). Formerly, each stamping was made on a separate press.

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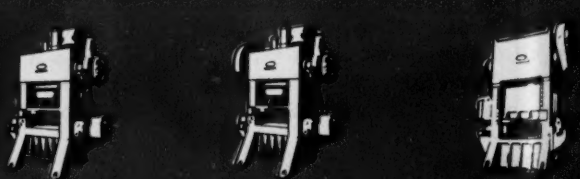

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EXCLUSIVE DANLY FEATURES POINT TO LOWER STAMPING COSTS

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Automatic lubrication flushes all bearings in crown and slide, including gibs, substantially increasing the prime life and top performance of the press.

Inspection operation showing both clutch plates and lamp mounting brackets in place on gages. These parts are alternately produced on the Danly Autofeed Press.

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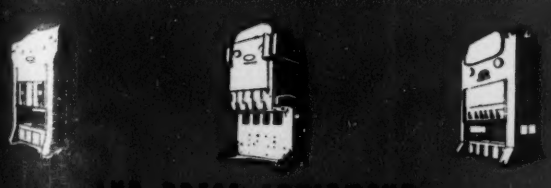

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WORKING WITH AIR *Can Cut Costs*

—provides more flexibility in trailer production

PNEUMATIC tools and other air-operated equipment is adding to the flexibility of Fruehauf Trailer Co.'s production of highway and low-bed trailers of varying design, sizes and metals. Operations described here are at the company's Western Division plants at Los Angeles.

The two adjoining plants are supplied with compressed air by two compressors, one of 715 cfm capacity and the other of 505 cfm capacity. Both are two-stage units, electric motor driven. A loop system of distribution in each plant assures a two-way supply of compressed air, and thus full efficiency of air-operated equipment, at whatever point the demand is greatest.

Impact wrenches are among the most widely used tools at the plant where there are a countless number of large and small bolts to be pulled down. The turning action of these wrenches is developed by rapid impacts which practically eliminate the torque reaction to the operator. This fact and the lightness of the portable tools in relation to their power turn fatiguing work into easy operations which smooth the production flow.

Portability Important—Portability of tools used on the big trailers is an essential production factor. By using compressed air as the power source for these tools they become portable in the true sense. The company's use of grinders illustrates this point. Any other power would require much heavier tools to do the same work. Cleaning of welds and other surface finishing on subassemblies and on the main assembly lines is simplified by the fact that the grinders are easily moved to wherever they are needed.

Percussion tools are required for caulking trailer bodies of one type, for scaling welds and for riveting. All of them have throttle valves which graduate the supply of air so the hammer may be started slowly if desired and speeded up to a rapid series of blows. As with the other pneumatic tools, the hammers vary in size and performance characteristics according to the nature of the work to be done. Hammers are easy to handle because the return stroke of the striking piston is always cushioned by air.

Cleaning Jobs—Air jets perform many cleaning jobs quickly and positively. Gasoline tanks are leak tested with compressed air from the plant lines at reduced pressures. Welding guns are air-operated. Air hoists are used at a number of stations for handling heavy parts or subassemblies.

One of the most important contributions of compressed air to production economies is on spray painting, as with all manufacturers where such work must be done. The painting is automatic on the trailers which move through the spray booth and into a finishing oven. Hand spray guns are used, in another booth, for parts and assemblies.

Versatility of compressed air becomes apparent as these and other applications, such as inflating tires and packing bearings, are observed in a single manufacturing operation. Compressed air has not only been put to work on many different and distinct kinds of applications, but also on the big and little jobs in each category.

Air lines reach to every working area to deliver air at around 100 psi. Regulators are used where lesser pressures are desired.

Despite the safety and trouble-free nature of a compressed air system and air-operated equipment, there are important economic factors. Ample compressor capacity is one of them. In the case of the Fruehauf plant, increasing use of compressed air has absorbed standby capacity and a new compressor has been ordered in addition to the two units which have been mentioned.

Ample Pressure—Another important factor is to have ample air pressure at the points of use in order to obtain maximum output from air tools. Most pneumatic tools are most efficient at a pressure of about 90 pounds. Productivity of the tools may drop as much as 50 per cent if the pressure drops to 60 pounds.

Data and photos for this article were obtained by the Compressed Air & Gas Institute.

This hydraulic squeeze riveter has attachments for punching rivet holes. It is used on chassis side rails

Considering the hourly cost of labor, no manufacturer using pneumatic tools can afford pressure drops of this kind.

Fruehauf maintains efficient pressures at the point of use by having ample compressor capacity and distribution through amply sized lines. Too small diameter lines are another cause of pressure drop at the point of work. The fact that escaping air is neither obnoxious nor dangerous does not mean that such a condition may be ignored. Leaks are still another cause for pressure drop. This condition is avoided by simple leak checking methods and keeping air lines tight.

Packaging Cost Pamphlet

AMERICAN Management Association, New York, is publishing two pamphlets, "Cost Reduction in Materials Handling and Shipping" and methods for "Improving the Efficiency of Packaging Production". Specialists in various aspects of packaging design, engineering and production are the authors of the 14 papers presented in the two pamphlets.

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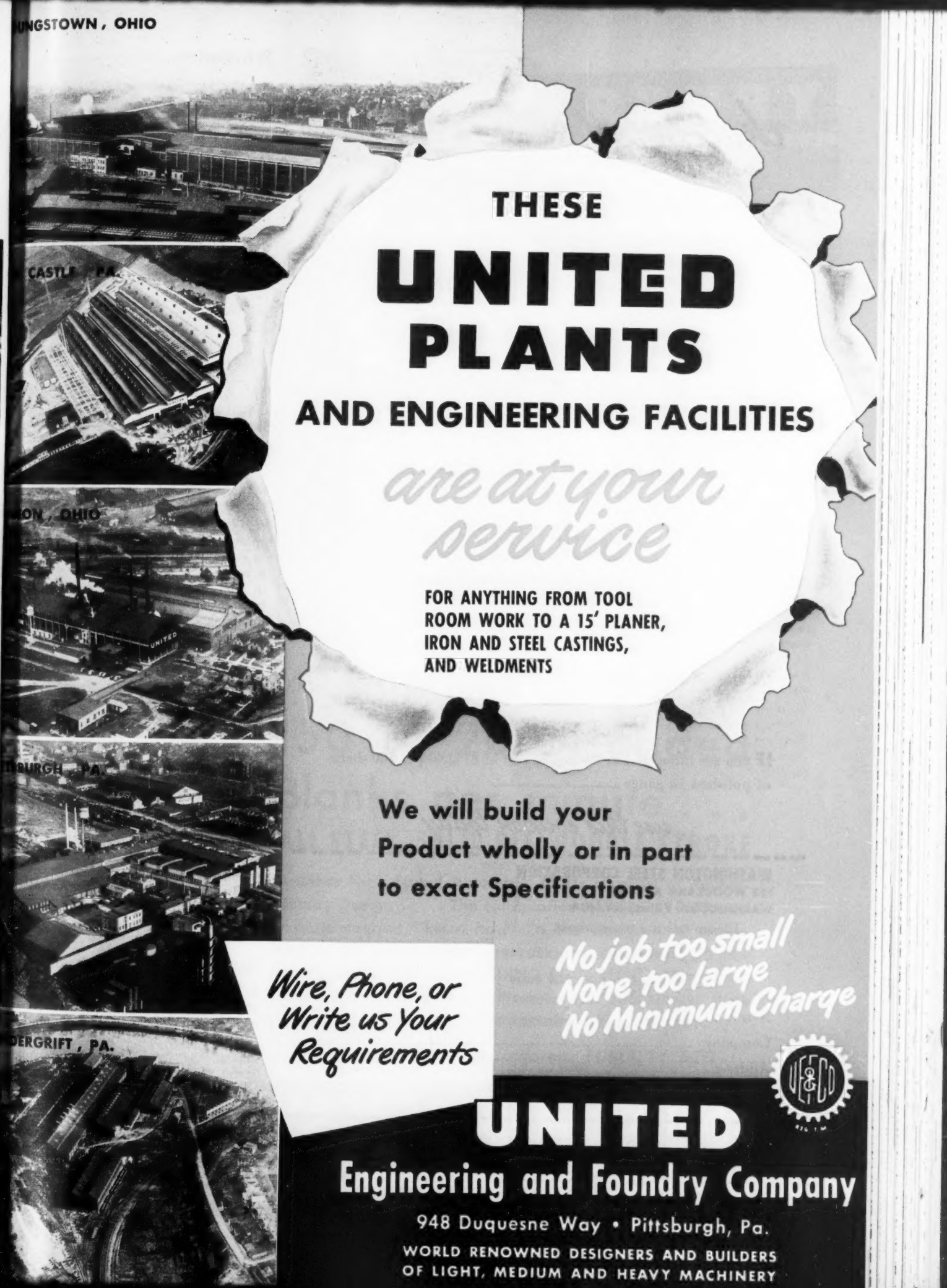
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Refractories

(*Concluded from Page* 98)

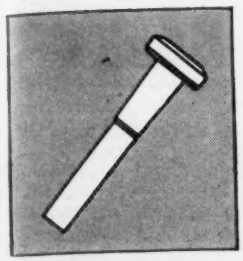
Selection of Refractories Important—Because of the different conditions which exist, even in furnaces of the same type and design, it is impossible to predetermine the exact refractory which will perform best in each part of any particular furnace or other piece of equipment. There are, of course, generally approved selections that will be found satisfactory in a majority of cases, but only actual production runs can determine the precise refractory which will render the most economical service in any individual piece of equipment.

When any refractory fails, the causes of failure should be determined as accurately as possible. This information will enable the refractories manufacturer to recommend another type better-suited to withstand the conditions which caused the failure. Only by close co-operation between equipment operators and refractory manufacturers can the most economical applications of refractories be accomplished.

Modern refractories practice aims to supply each part of a furnace with a refractory best-suited to conditions in that area, with the objective of having the essential refractories wear out simultaneously after maximum furnace production has been obtained. Since refractories, in most applications, are used up in the course of obtaining production, they must be considered as a direct production expense. Their cost for any portion of a furnace or other production equipment is therefore important only as it affects the total cost per unit of product obtained. Repairs, labor and lost production time often comprise a substantial portion of total cost. This explains why it is often economical to use a much higher-priced refractory for all or part of a furnace when, by its use, repairs are avoided and the resulting increased production gives a lower cost per unit of product.

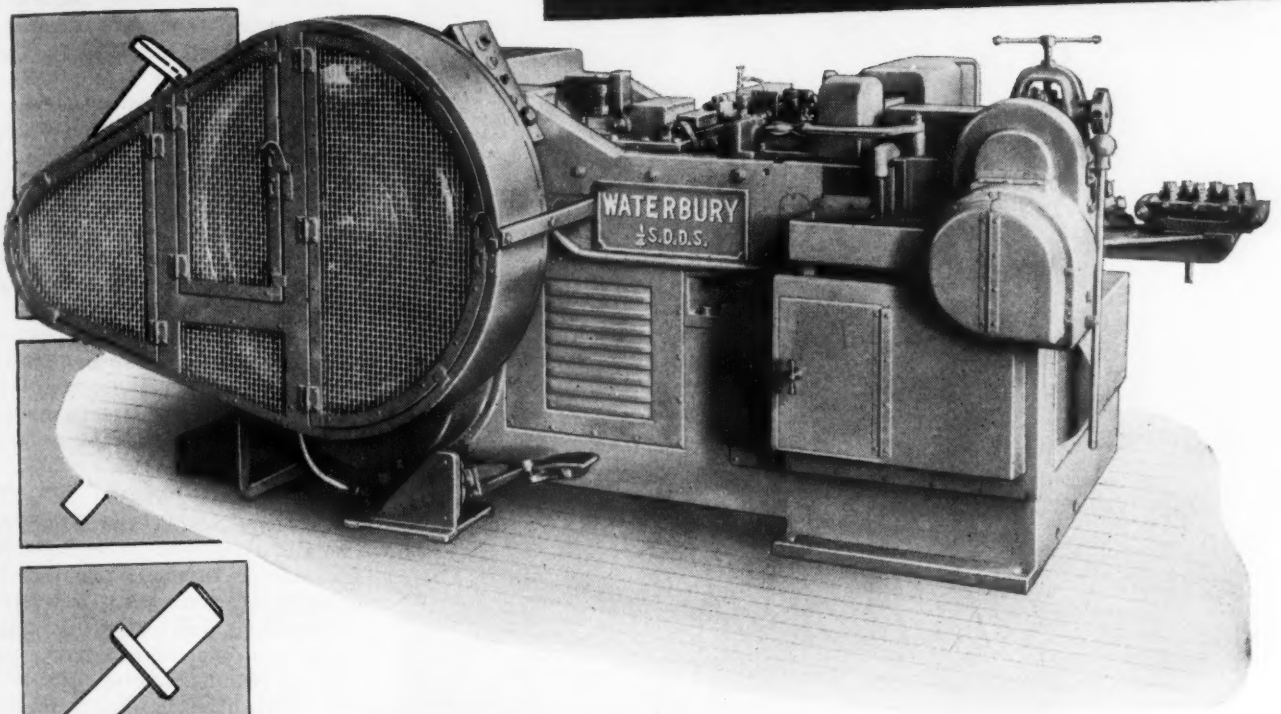
New Stainless Powder Types

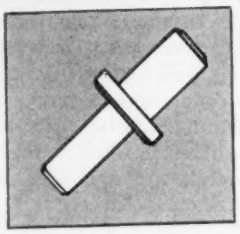
A 15-TIME increase in the green strength—the strength of the pressed compacts prior to sintering—of a new stainless steel powder type is announced by American Electro Metal Corp., Yonkers, N. Y. Chemical analysis of the new powders is said to correspond to that of standard chrome and chrome-nickel steels, and parts prepared by pressing and sintering the powders reportedly exhibit the same high mechanical strength and corrosion resistance characteristic of these compositions.

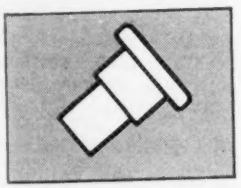


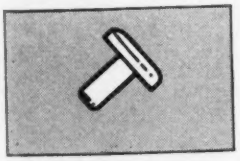
The new

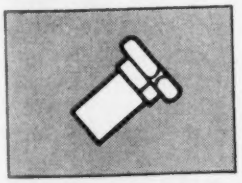
WATERBURY HI-PRO

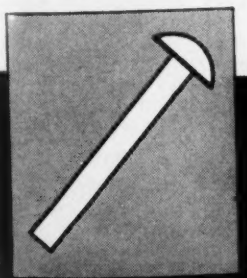












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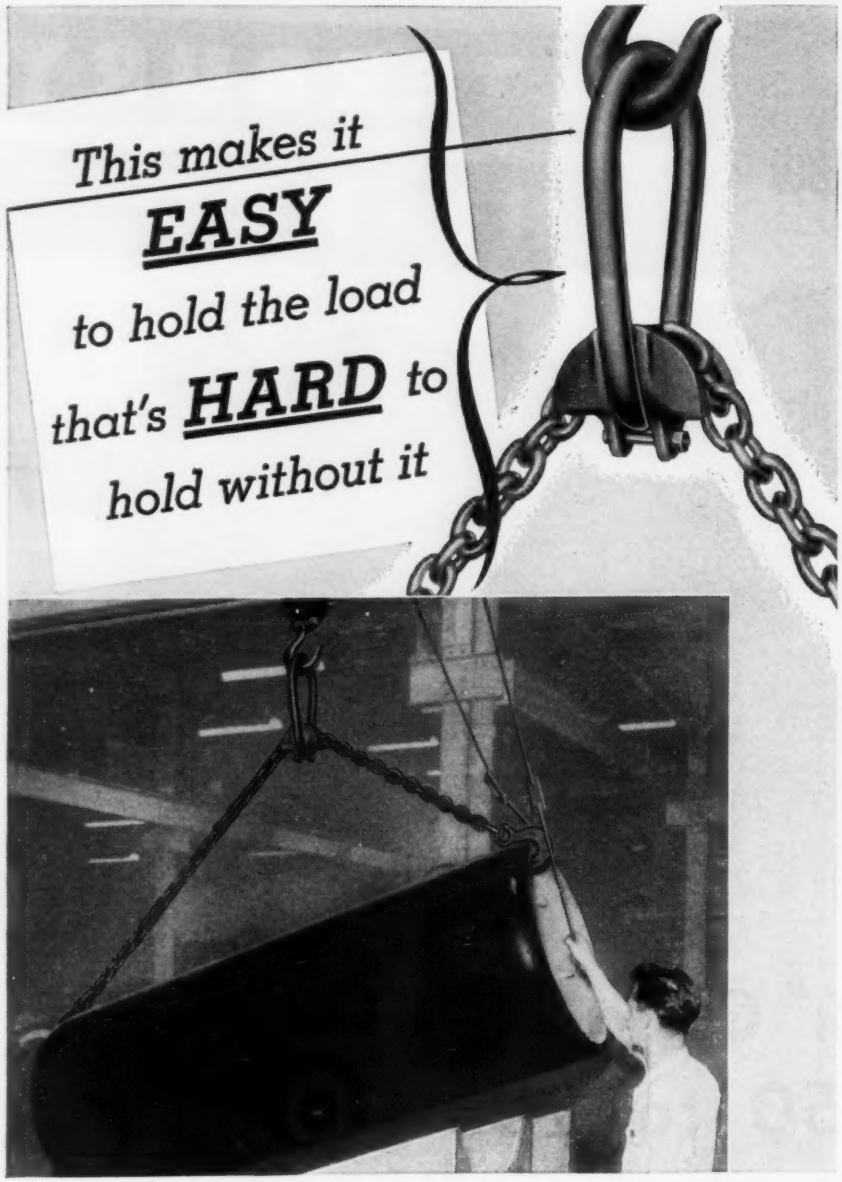

The New ACCO Sling Chain Adjuster

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New Books

The Story of Magnesium, by W. H. Gross; cloth, 262 pages, 5¼ x 7¾ inches; published by American Society for Metals, Cleveland, for $2; available from STEEL, Penton Building, Cleveland, O.

The story of the metal which prior to the recent war was a by-product of the chemical industry and used at the rate of only 7 tons daily, is told in this book which makes use of 100 illustrations. Wartime demand for the material caused the government to build plants capable of producing 300,000 tons per year. The author tells of the amazing expansion, of the methods of making this metal from rocks, brines and salt water and the properties of the metal and its alloys, as well as the process whereby metal in ingot form can be converted into various finished products. Detailed information is given on how to cast, machine, rivet and weld this metal.

The book is written in simple phraseology within the educational range of those who do not have professional or technical training. Use is made of charts and drawings to supply additional information. Included are chapters on alloying, melting and refining, casting, fabrication, machining, joining, surface finishing, physical metallurgy and uses of the light weight material.

Stainless Steels, by Carl A. Zapffe, consulting metallurgist; fabrikoid, 368 pages, 6¼ x 9¼ inches; published by American Society for Metals, Cleveland, for $5; available from STEEL, Penton Building, Cleveland, O.

In his preface, the author states that stainless steel is not an alloy; it is a name inherited by a great group of alloys, a special classification of special steels and a field of study in itself. He states that it is almost impossible to write a short definition, in fact the seven chapters of this book define the material.

As the science of stainless steel is vast and complex, the subject is highly technical; accordingly the objective of the book is to describe the fundamentals of stainless steel with every attempt to simplify its feature for the broadest possible reception, although some of the most important aspects involve the most technical principles. The reader whom the author is addressing is supposed to have only a smattering of metallurgy, but a real interest in educating himself in this field regardless of his background.

Extensive use is made of photographs, microphotographs, charts,

graphs and tables in the presentation of the subject matter. Chapters are devoted to the following subjects: Historical background, corrosion resistance, metallurgical construction, production, fabrication and finishing and martensitic, ferritic and austenitic stainless steels. Besides containing a valuable glossary and bibliography, the book also has a subject index plus an author index keyed to the text.

Manager von Morgen (*Manager of Tomorrow*), by Herbert Gross, Dusseldorf, Germany, editorial correspondent, STEEL; hard paper cover, 295 pages, 4¾ x 8 inches; published by Droste-Verlag, Dusseldorf; available from STEEL, Penton Building, Cleveland, O.

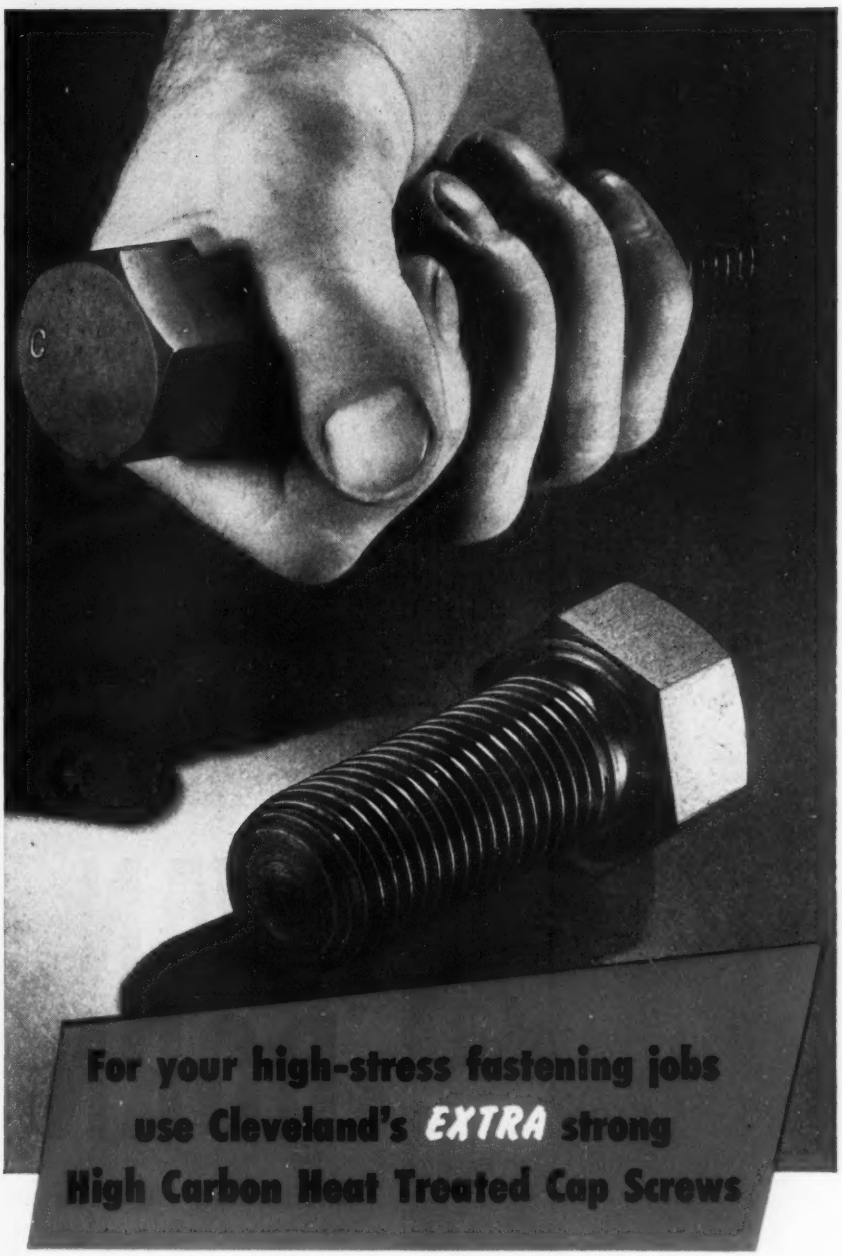
An advocate of managerial reform, the author believes that as much time and effort should be devoted to study of manpower and management as has been given to machines and manufacturing methods. The book, written in German, is based upon American methods as they might be applied in German industry. The author has worked for United States, Canadian and Mexican publications as German correspondent.

Shears 12 Feet of 1-Inch Steel

ABILITY to cut steel plate 1 inch thick and 12 feet long at the rate of 25 strokes per minute is built into the heaviest Steelweld shear built to date, according to Cleveland Crane & Engineering Co., Wickliffe, O. Machine has no slides or guides for the knife to work in, as it uses the pivoted-blade cutting principle; the upper blade operates on two heavy pins secured to the side frames and travels in a circular path.

Both frame and blade of the new shear are of all-welded one-piece steel construction. The micro-speed knife adjustment makes it possible to rapidly change knife clearance to suit various plate thicknesses. This is performed in a matter of seconds by turning a hand crank and watching a dial indicator which shows clearance in thousandths of an inch, and also the plate thickness which may be cut for any knife setting.

The shear throat is 24 inches deep, standard for all Steelweld shears made by the company. Frame bed and crown are welded integral with side frames, this feature reportedly providing rigidity and accuracy. Ball bearing transfers in the bed facilitate movement of steel through the knives. An electric foot switch connected to the shear by a cable makes control of the machine easy, the company reports. The switch may be moved about the floor to the most convenient spot.



● Popular fasteners of great strength and uniform accuracy, Cleveland's High Carbon Cap Screws are made by the Kaufman Process. This famous *Double Extrusion* method assures more uniform dimensions within the tolerance range in the finished product and creates beneficial changes in the steel's grain flow. Complete range of sizes, diameters from ¼" upward. Write for our monthly stock list for quick help in finding fasteners you need.

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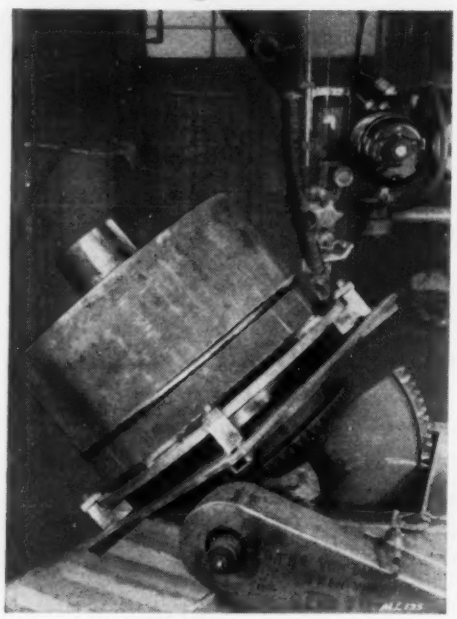

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Profusely illustrated; describes the many advantages of Weldments, and Van Dorn's extensive facilities.

CALENDAR OF MEETINGS

Mar. 14-16, Society of Automotive Engineers: Passenger car, body and production meeting, Hotel Book-Cadillac, Detroit. Society headquarters are at 29 W. 39th St., New York.

Mar. 16-17, American Management Association: Marketing Division, at Hotel Statler, New York. Association headquarters at 330 W. 42nd St., New York.

Mar. 16-17, Pressed Metal Institute: Technical symposium on cold extrusion of steel, Hotel Carter, Cleveland. Registration fee is $5 for anyone interested. Institute headquarters are at 13210 Shaker Sq.., Cleveland.

Mar. 20-25, Concrete Reinforcing Steel Institute: Meeting, at The Shamrock, Houston. Institute headquarters are at 38 S. Dearborn St., Chicago.

Mar. 21-22, Steel Founders' Society of America: Annual meeting, Edgewater Beach Hotel, Chicago. Society headquarters are in the Midland Bldg., Cleveland.

Mar. 22-23, Malleable Founders' Society: Market development conference, Evanston, Ill., in co-operation with Northwestern University. Society headquarters are in the Union Commerce Bldg., Cleveland.

Mar. 24, Malleable Founders' Society: Western sectional meeting, Drake Hotel, Chicago. Society headquarters are in the Union Commerce Bldg., Cleveland.

Mar. 28-31, Society of the Plastics Industry: Fourth national plastics exposition, Navy Pier, Chicago. Society headquarters are at 295 Madison Ave., New York.

Mar. 29, Material Handling Institute Inc.: Meeting, Hotel Cleveland, Cleveland. Institute headquarters are at 1108 Clark Bldg., Pittsburgh.

Apr. 3-4, Association of Iron & Steel Engineers: Spring conference, Birmingham. Association headquarters are in the Empire Bldg., Pittsburgh.

Apr. 4-7, National Association of Corrosion Engineers: Sixth annual conference, Hotel Jefferson, St. Louis. Association headquarters are in the Milam Bldg., Houston.

Apr. 5-7, Midwest Power Conference: Sponsored by Illinois Institute of Technology and 18 universities and professional societies, at Sherman Hotel, Chicago. Conference director is Roland A. Budenholzer, Illinois Institute of Technology, 3300 S. Federal St., Chicago.

Apr. 5-7, American Institute of Electrical Engineers: Second conference on electric welding, Rackham Educational Memorial Bldg., Detroit. Institute headquarters are at 33 W. 39th St., New York. Co-operating societies are American Welding Society and Industrial Electrical Engineers' Society of Detroit.

Apr. 10-12, Iron & Steel Division, AIME: 33rd annual conference, Netherland Plaza Hotel, Cincinnati. AIME headquarters are at 29 W. 39th St., New York.

Apr. 10-12, American Society of Lubrication Engineers: Annual convention and show, Hotel Statler, Detroit. Society headquarters are at 343 S. Dearborn St., Chicago.

Apr. 10-14, American Society of Tool Engineers: Industrial exposition, Philadelphia Convention Hall, Philadelphia. Society headquarters are in the ASTE Bldg., 10700 Puritan Ave., Detroit.

Apr. 11-12, American Zinc Institute: Meeting, Hotel Statler, St. Louis. Institute headquarters, 60 E. 42nd St., New York.

Apr. 12-14, National Petroleum Association: Meeting, Hotel Cleveland, Cleveland. Association headquarters are in the Munsey Bldg., Washington.

Apr. 12-14, American Society of Mechanical Engineers: Spring meeting, Hotel Statler, Washington. Society headquarters are at 29 W. 39th St., New York.

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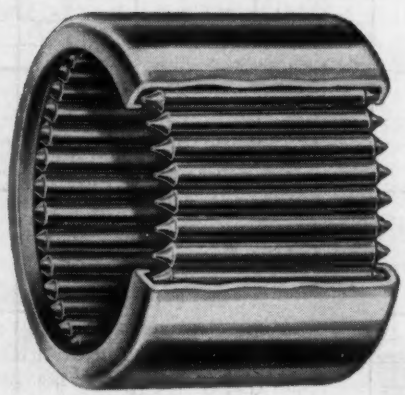
give maximum load distribution

Torrington Needle Bearings distribute radial loads over a greater bearing area than any other type of anti-friction bearing of comparable size.

This unique engineering feature of Torrington Needle Bearings assures maximum load capacity for any given housing or shaft size.

Where you encounter high load conditions with fixed or rigid space limitations, you will find the Torrington Needle Bearing specially engineered to give you this and other important advantages. Why not discuss your problem with our engineers? They'll be glad to help you.



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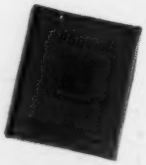


THE ARISTOCRAT OF BEARINGS

HOOVER BALL and BEARING CO.
Ann Arbor, Michigan

LETTERS *to the Editors*

Price Information Forwarded

My company is anxious to get a summary of the Connellsville beehive furnace coke prices which you list regularly each week. If possible we would like to get these weekly prices as far back as 1940 and up to the present time.

Schuyler F. Baldwin, Manager
By-Product Sales & Transportation Depts.
Rochester Gas & Electric Corp.
Rochester, N. Y.

Compilation of the prices as reported in STEEL are being sent.—The Editors

Help in Getting Started

We are just getting started in the selling and fabrication of steel reinforcing and structural steel. One of our big problems seems to be the present standard manufacturing of I-beams, etc. Also prices, freight rates, classification, and so forth. I would appreciate any information you could send us on how to secure this information.

H. A. Wilson
Wilson Glass & Supply Co.
Cadillac, Mich.

Our suggestion to you would be to contact one of the large steel mills for the information you request on your problem.—The Editors

We Elaborate

We would apreciate it if you would elaborate on the sulphur-base coolant used for broaching by Lapointe. It is mentioned in the last paragraph on page 63 of the Jan. 23, 1950 issue of STEEL.

J. T. Fish, Chief Chemist
Metallurgical Dept.
Ingersoll-Rand Co.
Phillipsburg, N. J.

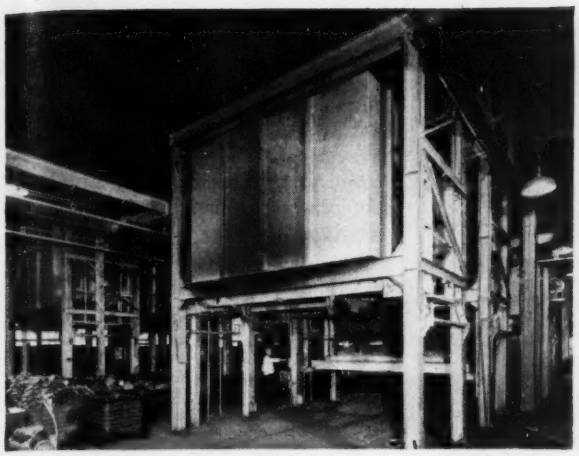
Lapointe Machine advises us that the sulphur base coolant used for broaching is Socony Sultran B 5. On a similar job at Wright Aeronautical, Steward Thread Cut No. 99 was used.—The Editors

Has Faucet Trouble

We are experiencing difficulty with a chemical reaction in our containers of cleaning material, which we believe is caused by the use of cast iron plugs and faucets in steel drums in which any coating or lining has been completely eliminated. It is the contention of our chemist that the use of cast iron fittings in a steel drum sets up a bio-chemical reaction which discolors our material.

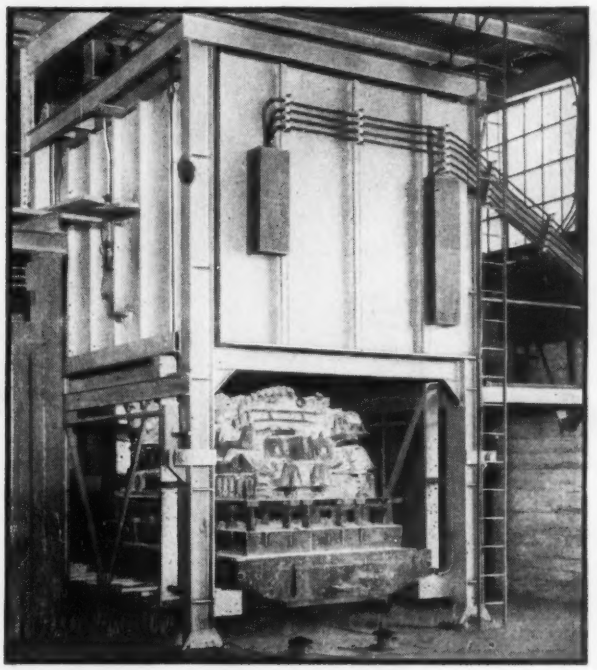
In the process of eliminating all the undesirable features in our containers we have discontinued the use of bungs and flanges having any kind

Annealing malleable iron castings



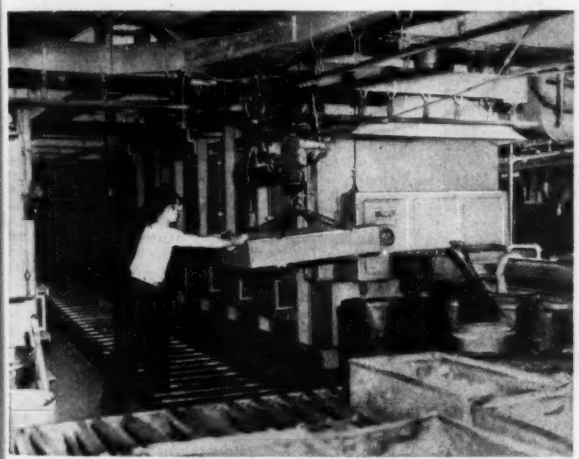
. . . four pairs of G-E electric furnaces anneal 32 tons per day in this midwestern foundry.

Annealing steel castings



. . . one G-E elevator furnace anneals 10 tons per charge in this southern foundry.

Annealing grey iron castings



. . . two pusher-type G-E furnaces anneal 30 tons per day in this eastern plant.

DO IT BETTER *Electrically*

Tell us about your annealing job, and we'll show you what General Electric furnaces can do for your particular operation. G-E furnaces and electronic induction heaters are also available in a variety of types and ratings for brazing, hardening, drawing, soldering, carburizing, and most other heat-treating processes. Ask your nearest G-E office to put you in touch with a G-E Industrial Heating Specialist. Or write direct to *Sect. 720-9, Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

ELECTRIC FURNACES

In addition to a shorter time cycle and increased output, they also give you:

- Lower over-all cost
- More uniform, better quality anneal
- Materially reduced cleaning costs
- Minimized thermal losses
- Cleaner, cooler working conditions
- Dependable continuity of service with less maintenance
- Less floor space required

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Spur Gears
by Horsburgh & Scott

● Spur Gears by Horsburgh & Scott are "steel muscled" with rims, arms and hubs extra heavy for the pitch. Unless otherwise specified, steel gears are made from .40 carbon steel which has a higher tensile strength and wears much longer than the commonly used .15-.20 carbon steel. These and many other features make H & S gears stand the "gaff" under heavy load conditions . . . giving long and uninterrupted service.

Send note on Company Letterhead for 488-Page Catalog 41

THE HORSBURGH & SCOTT CO.
GEARS AND SPEED REDUCERS
5112 HAMILTON AVENUE • CLEVELAND 14, OHIO, U. S. A.

of plating and without exception have been using cast iron fittings and faucets. In view of the recent findings of our laboratory technicians that there is a chemical reaction caused by the use of two different metals in the same container, we are concentrating our efforts towards obtaining a steel faucet. We shall greatly appreciate your advising us of the availability of a steel faucet.

J. M. Hart
Purchasing Agent
National Laboratories Inc.
Toledo, O.

A list of manufacturers of various types of faucets is being sent.—The Editors

Wire Product Production

If available, it would be appreciated if you would forward any recent tabulations of ferrous and nonferrous wire capacity and/or production figures. Any figures you may have concerning the end use identification of manufactured wire such as fence wire, nail wire, and so forth, would also be appreciated.

Irving M. J. Kaplan
Pittsburgh, Pa.

Wire production capacity figures are not available either for the ferrous or nonferrous industry. But we can give you production figures on ferrous wire products, similar figures of nonferrous not being available. The American Iron & Steel Institute reports the following production figures for 1948: Wire rods, 610,348 net tons; drawn wire, 2,673,276 net tons; nails and staples, 859,540 net tons; barbed and twisted wire, 254,629 net tons; woven wire fence, 399,457 net tons; bale ties, 113,892 net tons. Production of wire products in 1948 accounted for about 8 per cent of the total finished steel shipments. Figures for 1949 are not yet available.—The Editors

Steel-Bronze Relationship

We are interested in studying the relationship of prices of steel with the prices of bronze ingot and scrap. We write to ask if you are familar with any published studies of this nature.

George M. Rounds
Sales Promotion Dept.
Magnolia Metal Co.
Elizabeth, N. J.

No such study is available as far as we know. Price data on both bronze ingot, scrap and steel are available, however. The metalworking facts and figures section of STEEL's Metalworking Yearbook, Jan. 2, 1950, presents much of this information.—The Editors

Interest in Extras

We are very much interested in your recapitulation of average increases in base price and average extras for various basic steel products as announced by U. S. Steel Corp. shown on bottom of page 45 in your Dec. 19, 1949 issue of STEEL. If possible we would like to obtain your figures on the average extras before (or after) such increase. We feel that with these figures we will have a better picture of the percentage of increase.

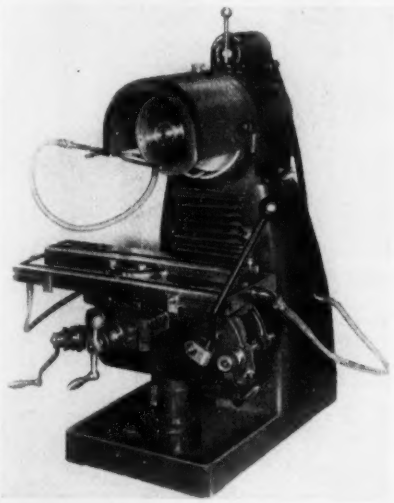
Z. F. Bond
General Buying Dept.
Proctor & Gamble Mfg. Co.
Cincinnati, O.

STEEL for Dec. 26, page 17 has a comparison with respect to steel extra cost somewhat along the line suggested in your letter. Plans are to extend this further; from time to time more detailed studies of the extra situation will be made.—The Editors

New Products and Equipment

Carbide Tool Grinder

Usable as a surface and chip breaker grinder and as a universal tool and cutter grinder is the bench-type carbide tool grinder announced by Wickman Mfg. Co., 15531 Woodrow Wilson Ave., Detroit 3, Mich. Intended



for use with diamond wheels of all types, machine is provided with a swiveling table and motor with micro setting scales for accurate grinding and resharpening of cutters, reamers, counterbores, etc.

Power is furnished by a special 2850 rpm, 1 hp reversing motor. Grinding wheels are mounted directly on the 1¼-inch ball bearing spindle or on either of two adaptors which give spindle extensions of 2⅛ and 5⅜-inches. Coolant is supplied by a centrifugal pump which delivers 12 gallons per hour. Coolant adaptors for grinding and for cutting off and chip breaker grinding are supplied.

Check No. 1 on Reply Card for more Details

Brinell Hardness Tester

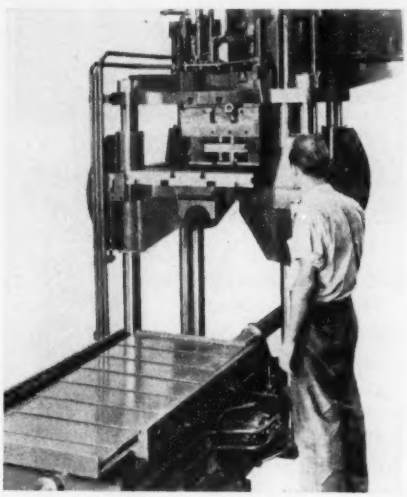
Three sizes of Brinell balls and varied pressure make possible the accurate indication of metal hardness with the improved dwarf Brinell hardness tester offered by R. Y. Ferner Co. Inc., Boston 48, Mass. Press consists of two hardened tool steel units of sharply tapered form, joined by two tempered thin fulcrum plates to facilitate a new pressure method for this type of work. At the end of the lower unit is an adjustable screw sliding in a tube of the upper unit which carries a large dial indicator.

Lower unit screw is adjusted to set the dial to zero before the load is applied. Outfit is supplied with 10.0, 5.0 and 2.5 mm diameter balls. Opposite the penetrator mounting and integral with the upper leg is carried the device for receiving the load. This may be used in a vise, drill or arbor press or many of the common types of machine tools.

Check No. 2 on Reply Card for more Details

Machine Tests Dies

Opening and closing dies with such accuracy that the parting line may be matched perfectly before the die leaves the tool room is the function of a die testing machine developed by Lester Engineering Co., 2711 Church Ave., Cleveland 13, O. In operation, the two halves of the die are clamped to the two machine



platens. The bottom platen moves down and then out horizontally, the die then being at a convenient height and easily reached and worked on. It can be quickly moved in and up in perfect alignment for checking.

Oil cylinders are located inside two of the vertical columns, there being no need for a pit to accommodate an oil cylinder even though the bottom plate is movable. Although the vertical travel is 36 inches, the machine will fit under a 10-foot ceiling. Locking pressure is 50 tons, minimum die height is 14 inches, vertical die opening is 36 inches and daylight when fully opened is 50 inches. Die table size is 28 x 58 inches.

Check No. 3 on Reply Card for more Details

Measures Internal Grooves

Diameter to be measured is found quickly and shown immediately on the indicator dial of a gage built by Rimat Machine Tool Co., 1117 Air Way, Glendale, Calif. The dial bore gage will measure diameters of internal grooves for O-rings, snap rings, oil rings, etc., as well as diameters of straight bores.

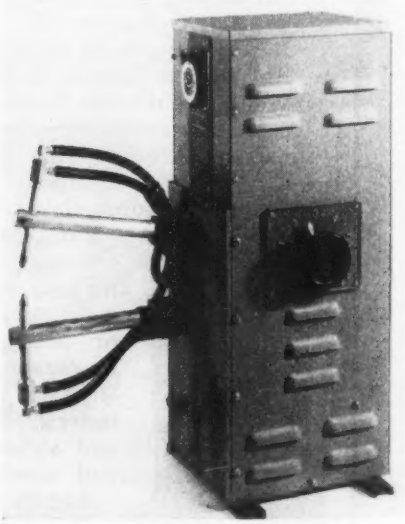
Standard instruments are made to measure all diameters from ½ to 6 inches and special models are available for unusual requirements. Two series are produced: Series S giving direct readings in thousandths over the entire range of the instrument; and series T giving plus or minus indications in tens of thousandths for any dimension to which the gage is set. Standard tip sizes are $\frac{1}{16}$ and ⅛-inch OD on specific models, with special tips available.

Check No. 4 on Reply Card for more Details

Electronically Timed Spotwelder

Featuring water-cooled electrodes and secondary coil, the model 130T spotwelder with electronic timer, manufactured by Birdsell Mfg. Co. Inc., P. O. Box 733, Los Altos, Calif., has a capacity of two pieces of 16 gage cold rolled steel. Rated at 4.6 kva, the welder has a throat depth of 18 inches. Operation is on 220 v 60 cycle single phase current.

Electrode holders are ⅝-inch in



diameter and may be rotated to right or left. Arms are 1 inch in diameter, made of hard drawn copper and have a 5-inch spacing.

Check No. 5 on Reply Card for more Details

Analyses by Direct Combustion

Intended for carbon and sulphur analyses of iron and steel by direct combustion at temperatures in excess of 3000° F is a high frequency combustion unit designed by Lindberg Engineering Co., 2444 W. Hubbard St., Chicago 12, Ill. Apparatus generates heat only in the metal sample, 2 or 3 seconds being required to melt the sample. Adjacent parts, such as crucible, tube, etc., are heated only

Job File No. 194

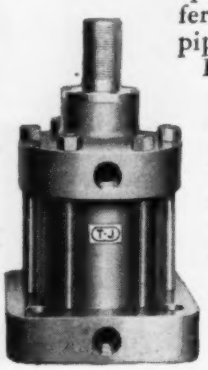
MALLEABLE NUT PRODUCTION

Fully Automatic

CONTROLLED BY T-J CYLINDERS

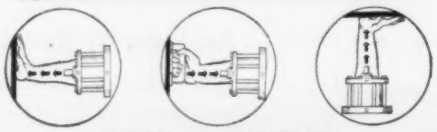
All moving parts are controlled hydraulically by T-J Cylinders—on this Malleable Nut Production Machine designed and built by Roy Hays & Associates, Rockford, Ill., for the Wagner Malleable Products Co., Decatur, Ill.

It's *fully automatic*—the operator only places nuts in stations. Nine T-J Cylinders, 40 ton to ½ ton, help complete the job of cutting off sprue, sizing, boring, facing, chamfering and threading 2,500-¾ std. pipe thread nuts per hour.



For your tough jobs of power movement — pushing, pulling or lifting—*save labor, speed production* and *cut costs* with T-J Air and Hydraulic Cylinders! Many standard sizes and styles . . . both cushioned and non-cushioned types . . . 100 lb. or 50,000 lb. Precision-built for long-life dependability. Write for latest catalogs. The Tomkins-Johnson Co., Jackson, Mich.

FOR POWER MOVEMENT IN ANY DIRECTION



100 LB. or 50,000 LB.

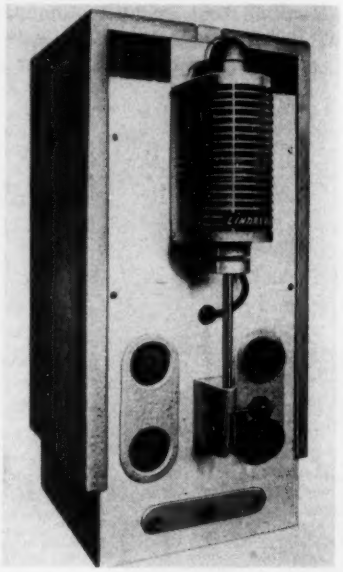
T-J

TOMKINS-JOHNSON

RIVITORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS

by radiation or conduction from the relatively small mass of the charge.

Equipment is comprised of a short vertical glass combustion tube surrounded by an air-cooled coil to which radio frequency energy is supplied by a vacuum tube oscillator. A high refractory "cupelet" withstands the thermal shock produced during the

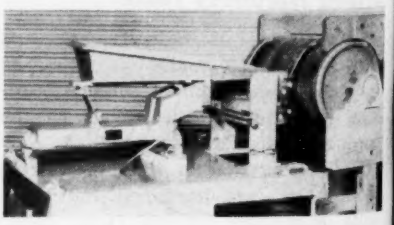


combustion cycle. Oxygen is introduced through integral piping, its flow being regulated by valves on the front panel. Atmosphere seals are provided by aluminum breech connectors in conjunction with synthetic rubber O-rings, outside the heated zone. Relative position of the coil and crucible is adjustable.

Check No. 6 on Reply Card for more Details

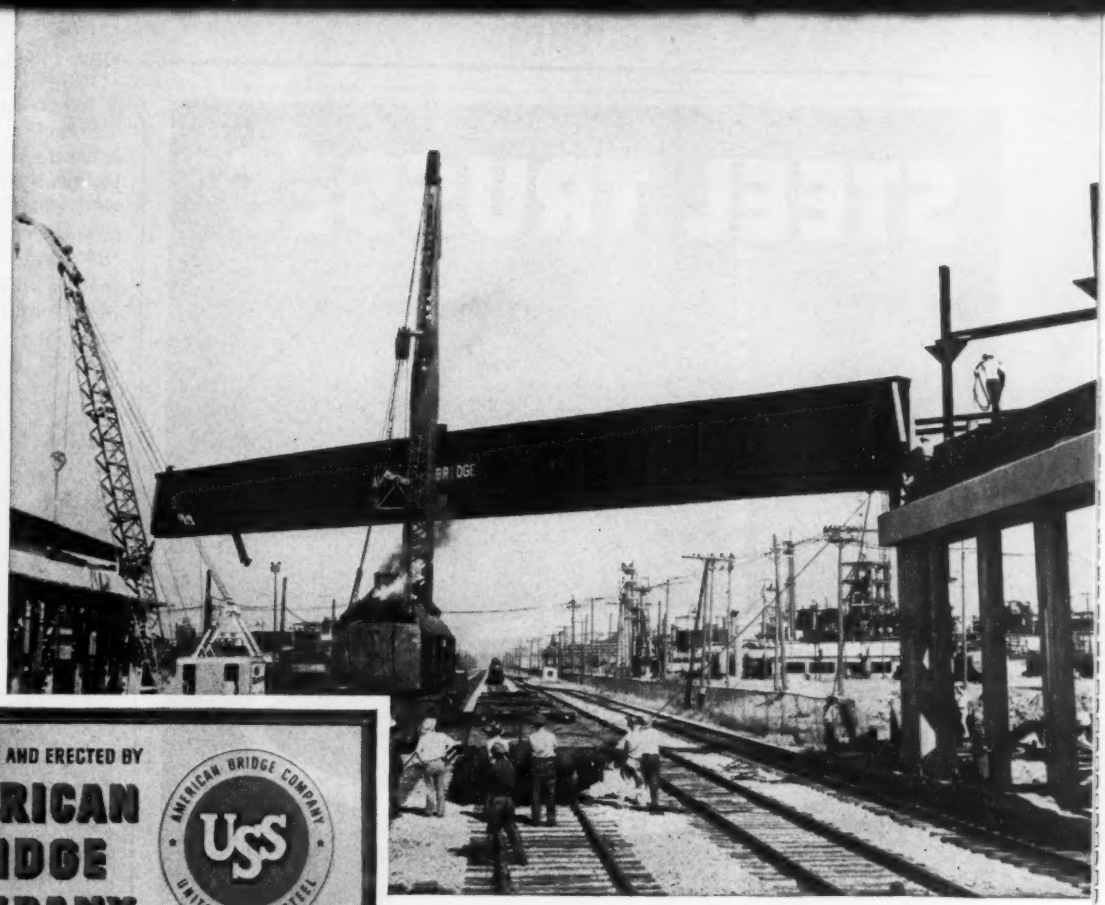
Nonelectric Agitator Separator

Separation of small amounts of nonmagnetic material from large amounts of magnetic material is possible with a nonelectric agitator separator developed by Eriez Mfg. Co., State St., Erie, Pa. This type of



separation has been difficult because of the trapping of nonmagnetic material among the magnetic particles as the latter are drawn into the magnetic field.

Agitator separator consists of a permanent magnetic pulley, the surface of which consists of alternate lengthwise slats of Alnico, alternated with slats of nonmagnetic material



erican Bridge erects an 88-ton, long plate girder span over Chesapeake and Ohio Railway s in the yards of The Dow ical Company, Midland, higan. This structure was d without hindering rail traf- Darin & Armstrong, Inc., al Contractors; L. W. Mil- Consulting Engineer.

ing highway overpass above Pennsylvania Railroad tracks, York Division, Mercer ty, Trenton, New Jersey. De- the maze of electric transmis- lines surrounding the work, the rail traffic below, American ge completed the job success- without interruption to traf- Kaufman Construction Com- Contractors; Designed by Jersey State Highway Depart-

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AMERICAN BRIDGE COMPANY

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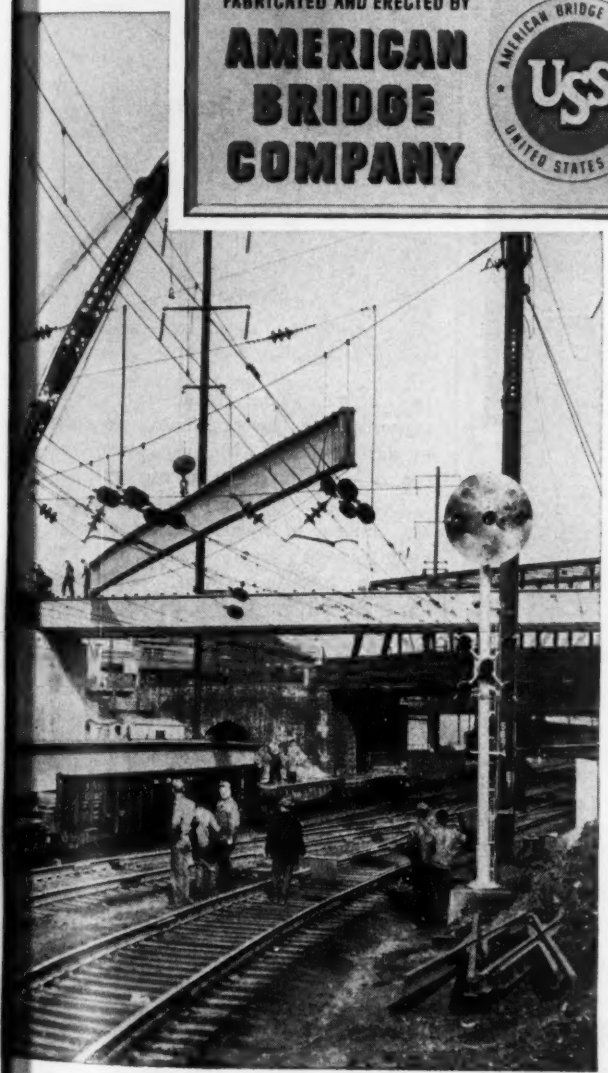

When erection will be under difficulties —*it's a job for* American Bridge

● We offer the erection of the plate girder span over the Chesapeake and Ohio Railway tracks at Midland, Michigan—and the erection of the highway overpass above the Pennsylvania Railroad tracks at Trenton, New Jersey, as substantial proof of this fact:

Regardless of how complex or difficult your job may be, you can be sure it will be done right if you call on American Bridge.

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AMERICAN BRIDGE

UNITED STATES STEEL

STEEL TRUSSES

for America's

Newest High Production

Open Hearth Furnace

Fort Pitt Bridge—fabricated the huge twin crane runway girders at the Weirton Steel Company Open Hearth Furnace—*largest in the steel industry!* Length of each girder, 106′1½″, height of each girder, 11′11″, total weight of each girder, in place, 170 tons—or *340* tons of steel in *two runway girders,* that's a lot of steel, fabricated to exacting specifications. For your structural steel requirements call on FORT PITT BRIDGE.

FORT PITT BRIDGE WORKS

Member American Institute of Steel Construction

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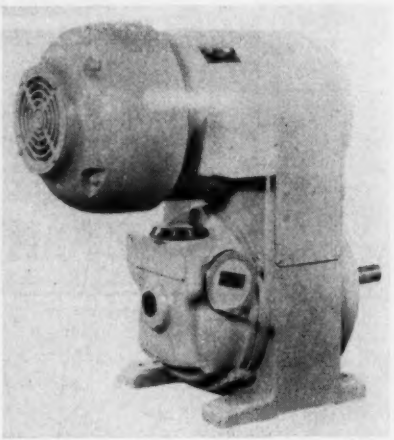
DETROIT, MICHIGAN . New Center Building

A receiving chute or vibrator tray distributes the material to be separated to a nonmagnetic vane assembly from which it passes to the pulley belt. The agitation of the thin layer of material flowing gradually down the chute frees the particles and makes pick-up easier. The nonmagnetic material drops through the vane assembly to its own receptacle.

Check No. 7 on Reply Card for more Details

Enclosed Cooled Motor

A totally enclosed fan-cooled variable speed motor unit is being offered by Sterling Electric Motors Inc., Los Angeles, Calif. Ample cooling is accomplished through forced draft ventilation by means of an external fan in a protected streamlined



fan cover. The Speed-trol closed-type motor is for application in dusty or damp places which are unsuitable for drip-proof or open motors.

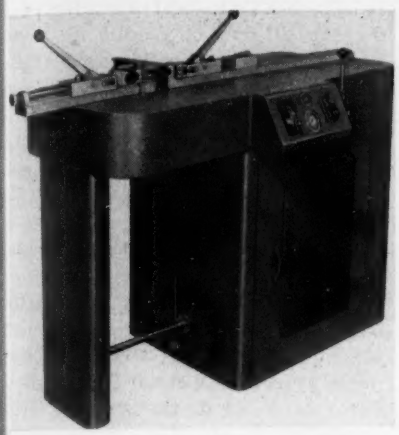
Feature of the motor is the fingertip control of speed with the large, easy-to-read speed indicator. This allows infinite speed adjustment through either the fingertip control on the motor or through mechanical, electrical or lever-type controls. It is built integrally with pulleys, shafts and belts, in one compact unit.

Check No. 8 on Reply Card for more Details

Performs Many Bending Jobs

Simple, compound and reverse bends may be formed with the Di-Acro Hydra-Power bender, offered by O'Neil-Irwin Mfg. Co., 237 Eighth Ave., Lake City, Minn. Tubing, angle, channel, extrusions, moldings, strip stock, bus bars, round or square rods and all other solid ductile materials may be bent on the machine. A Vickers hydraulic system incorporated in the machine assures a smooth flow of power. The correct bending speed for all types of materials may be selected by a variable flow control valve.

Engagement of the control lever starts the bending cycle, leaving the operator's hands free until the bend is completed and the bending motion is automatically stopped. A lever returns the machine at high speed to loading position. An automatic angle control allows a series of bends



of varying degrees to be progressively made in a single part without removing the piece. It is possible to form two bends simultaneously in one piece by "teaming up" two machines which may be as close as 18 inches center to center.

Check No. 9 on Reply Card for more Details

Measures Molten Iron

Temperature of molten white and gray irons in large or small ladles may be measured by the immersion method with the Ferrotemp pyrometer, available from Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich. Overall length of the 9-pound unit is 64 inches. The frame is of Inconel tubing. A fan shape meter, calibrated to read directly from room temperature to 3000° F, is mounted on one end.

On the other end is a noble metal thermocouple encased in a monolithic ceramic covering. The 6-inch thermocouple is easily replaced. Molten metal and slag will not adhere excessively to the protecting tube. A temperature reading of a ladle of metal when the unit is warm from previous use need not exceed 25 seconds, or 45 seconds if the unit is cold.

Check No. 10 on Reply Card for more Details

• • •

ACCELERATING RELAY: Designed for starting single-phase, capacitor-start and capacitor-start capacitor-run motors, an improved voltage type accelerating relay is announced by General Electric's Control Division, Schenectady 5, N. Y. Designated as CR1057-J, relay is particularly applicable where adverse atmospheric con-

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MONARCH SOLID TIRES

No down time for tire maintenance—right! But that's only part of the story. Monarch Solid Tires have an extra long service life, so they lower materials handling costs that way, too. They're tough, stable, sure-footed, and they can't puncture—Monarch-equipped vehicles go anywhere in the plant.

Monarch specialization pays off for you in better industrial tires, including such special types as Monarch Easy-Roll, Cushion, Static Conductor, and Neoprene Tires.

Write for specific information on the use of Monarch Solid Tires in your plant. THE MONARCH RUBBER CO., 300 Lincoln Park, HARTVILLE, OHIO.

Specify Monarch Solid Tires on your industrial vehicles. Replacement tires available from the manufacturer of your equipment.

MONARCH

Specialists in Industrial Solid Tires and Molded Mechanical Rubber Goods

ditions exist or where it is desired to have remote control which can be incorporated into an explosion proof case.

Check No. 11 on Reply Card for more Details

PLATFORM TRUCK: A combination steel frame and hardwood deck platform truck is announced by Rapids-Standard Co. Inc., Grand Rapids, Mich. It is available in same four series and eight standard sizes as the steel deck Roustabout model. Truck is available in tilt or level types with capacities up to 2 tons, depending on running gear.

Check No. 12 on Reply Card for more Details

RESTORES THREADS: An adjustable hand thread chaser to restore battered or crossed threads quickly and easily is announced by Owatonna Tool Co., Owatonna, Minn. It can be adjusted to any diameter from 1¼ to 5 inches. Tool comes equipped with six chaser dies which carry 16 thread pitches.

Check No. 13 on Reply Card for more Details

DRILL FOR HARDENED STEEL: National Tool Salvage Co., Detroit 10, Mich., announces a new center drill for hardened steel. It eliminates the necessity of two operations, drilling and countersinking, in cutting centers on tools that are not annealed.

Check No. 14 on Reply Card for more Details

WORK HOLDING CLAMPS: Two new heavy duty clamps have been developed by General Welding Corp., Cleveland, O. Plunger type clamp, model D-2, employs a bronze plunger, has a 1¾-inch stroke and pressure of 700 pounds. Model C-2 is a horizontal type toggle clamp with a pressure rating of 1000 pounds. It is recommended for milling and drilling operations.

Check No. 15 on Reply Card for more Details

CORROSION RESISTANCE: Allied Research Products Inc., Baltimore, Md., offers Iridite Alcote, a new finish for aluminum that provides corrosion resistance, paint adherence characteristics and abrasion resistance.

Check No. 16 on Reply Card for more Details

FOR SLOW SPEED APPLICATIONS: Designed primarily for light duty, slow speed antifriction bearing applications, the Flangette has been developed by Fafnir Bearing Co., New Britain, Conn. It is a simple arrangement of two pressed steel stampings to form a flanged housing enclosing the company's standard self-aligning wide inner ring type ball bearing. This ball bearing power transmission unit is available for shafts of 18 sizes, ranging from ½ to 2 3/16-inches.

Check No. 17 on Reply Card for more Details

ANTIRUST PAINT: Known as Rustrem Clear, a new paint announced by Speco Inc., Cleveland, O., can be brushed or sprayed directly over rust without wire brushing or scraping. It can be painted over with any good quality paint, except lacquer. It will not bleed through painted surfaces.

Check No. 18 on Reply Card for more Details

HANDLES CUPOLA LIDS: To speed up the handling of cupola lids and increase the safety factor in this operation, Woodhouse Chain Works, Trenton, N. J., offers a new line of cupola sling chains. Chain hooks are made with square ends and flat sides to fit into sockets of cupola lid.

Check No. 19 on Reply Card for more Details

FAST TITRATION: A new alternating current line-operated titration pH unit for fast and accurate titration, precise control of neutralizations, oxidation reduction reactions and precipitations and pH measurements, is offered by Central Scientific Co., Chicago 13, Ill. Its applications include determination of manganese in iron and steel, electrometric measurement of pH values of aqueous or partly nonaqueous solutions, etc.

Check No. 20 on Reply Card for more Details

LUBRICATES AUTOMATICALLY: An automatic conveyor chain lubricator, made by J. N. Fauver Co. Inc., Detroit 1, Mich., lubricates both the link pins and hanger pins of the chain continuously. The lubricant used is capable of withstanding temperatures up to 650° F.

Check No. 21 on Reply Card for more Details

OVERCOMES FLUID LEAKAGE: Repsco, a new mechanical rotary shaft seal, is announced by Republic Supply Co., Houston, Tex. Designed to overcome the problem of fluid leakage, it is fabricated to fit any pump, compensates for both end thrust and misalignment in pump and is hydraulically actuated and balanced by fluid pressure within pump.

Check No. 22 on Reply Card for more Details

CORROSION RESISTANT VALVE: Designed for shut off and throttling service with corrosive fluids free from abrasive solids, the new globe valve made by National Carbon Division, Union Carbide & Carbon Corp., New York 17, N. Y., is available in 1 and 2-inch sizes. Except for the Teflon packing, all valve parts in contact with fluid are Karbate impervious graphite. Valve is resistant to practically all corrosive chemicals and thermal shock.

Check No. 23 on Reply Card for more Details

HARD METAL DRILLS: Designed for the drilling of metals up to 60 Rockwell C hardness is new Firthite drill, developed by Firth Sterling & Carbide Corp., McKeesport, Pa. Drills are ground from solid Firthite, pointed and relieved for free cutting. They are available in sizes ⅛, 5/32, ¼, 11/32, ⅜ and ½-inch.

Check No. 24 on Reply Card for more Details

ATTACHMENTS FOR CARBIDE BITS: Designed primarily for use with tungsten carbide bits, the attachment made by Ingersoll-Rand Co., Phillipsburg, N. J., is of the shoulder type employing a patented 38-degree reverse-buttress thread. It was developed to resist shock, and impact while still preventing slippage, excessive thread wear or loss of drilling speed.

Check No. 25 on Reply Card for more Details

HOLLOW MILLS: Made of high speed steel, the hollow mills offered by Reltool Corp., Milwaukee 14, Wis., are available with two forms of teeth, undercut teeth for milling steel and straight teeth for milling brass and other nonferrous metals. Either type is furnished with three or four teeth as specified. They are available in hole sizes from 3/32 to 1 inch; shank sizes, ⅝ to 1¾ inches and overall lengths from 1½ to 2¼ inches.

Check No. 26 on Reply Card for more Details

NARROW PANELBOARDS: Square D Co., Detroit 11, Mich., introduces a new line of narrow width NMO-XX circuit breaker lighting panelboards to fit into the web of 8-inch wide-flange structural beams. It incorporates thermal magnetic breaker units that plug-in on cylindrical bus bars. Panelboards are available for both single phase, 3 wire, and three phase, 4 wire services with 15, 20, 30, 40 and 50 amp branch circuits.

Check No. 27 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Helpful Literature

75. Air & Gas Cleaners

American Air Filter Co.—8-page illustrated bulletin No. 130-E covers new designs and improvements in Cycoil Oil Bath air and gas cleaners. Model W03 which has been added to line utilizes tangential instead of peripheral air intake and permits control of air intake or addition of extension for use with intake unloading compressor.

76. Shear, Punch & Coper

Kling Bros. Engineering Works—12-page illustrated booklet presents details on combination machines for shearing, punching, coping, mitering, notching and cutting operations. Three sizes of machines and line of standard and special attachments are shown.

77. Industrial Wire Cloth

Buffalo Wire Works Co.—4-page illustrated form No. 597 describes industrial wire cloth that is galvanized after weaving to provide heavily coated, smooth-surfaced, rigid, square mesh for heavy-duty applications. Recommended uses, standard sizes and mesh carried in stock are listed in convenient tabular form.

78. Acidproof Drain Pipe

Duriron Co. — 12-page illustrated price list H-2 covers drain pipe and fittings for handling acid wastes. Data are included also on laboratory sinks and strainers, floor drains, traps and other fittings.

79. Portable Air Compressor

Davey Compressor Co.—2-page illustrated form E-233 is descriptive of Super Chief model 60-WBD portable air compressor with 60-cfm capacity. Unit features air cooling, automatic centrifugal clutch, 6-in. diameter tubular frame which also serves as air receiver, force-feed lubrication throughout and built-in unloader system.

80. Bending Presses

Cleveland Crane & Engineering Co.—8-page illustrated form No. 2010-E reviews line of Steelweld presses for plate thicknesses to 1 in. and lengths to 20 ft. With various jigs, dies and tools available, machines can be used for bending, forming, blanking, drawing, rubber-forming and multiple-punching of steel, aluminum and many alloys.

81. Industrial Fastenings

Blake & Johnson Co.—106-page illustrated catalog 50 describes complete line of fastenings and contains data on dimensions, materials, and finishes available. Machine, wood, and tapping screws; stove bolts; special headed and screw machine products; nuts; rivets; chaplets and wire forms are depicted and described.

82. Conversion Table

Babcock & Wilcox Tube Co.—Single card TDC-110 conversion table provides handy reference for engineers who frequently wish to convert inches and fractions of inches into decimal parts of a foot such as in application of steel tubing.

83. Welding Electrodes

All-State Welding Alloys Co.—32-page pocket-size combination low-temperature welding handbook and catalog lists various types of welding electrodes for gas and electric application as well as recommended fluxes and accessory equipment. New products in this revised edition include general purpose steel and high alloy steel electrodes, phosphor bronze 'A' electrode for arc welding, and silver-bearing copper alloy for gas welding.

84. Herringbone Gear Reducers

De Laval Steam Turbine Co., Imo-De Laval Products Div.—28-page illustrated bulletin H-HS lists specifications, standard types and sizes, selection information, horsepower ratings and other pertinent data relevant to herringbone gear reducers.

85. Fire Brick

Laclede-Christy Co.—6-page illustrated bulletin No. 202 refers to Keystone High Heat Duty dry press fire brick. They are adapted for use in boiler settings; open hearth and mill furnaces; glass, lime and chemical plants; and wherever high resistance to temperatures, permanent volume, spalling resistance and load-bearing qualities are essential.

86. Heavy-Duty Forgings

A. Finkl & Sons Co.—16-page illustrated job study is entitled "Mo-Lyb-Die Processed Miscellaneous Heavy Duty Forgings." Variety of these chromium-nickel-molybdenum forgings is depicted and steps in their manufacture reviewed.

87. Proportioning Oil Burner

Hauck Mfg. Co.—24-page illustrated catalog No. 410 deals with proportioning oil burner for accurate control of furnace temperature and atmosphere during heat processing operations. Unit features single control lever, uniformity of oil-air ratios and flame character from all burners on one furnace, and operation on heavy or light oils.

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13	33	53	73	93
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HELPFUL LITERATURE

88. Power Tools

Independent Pneumatic Tool Co.—Three illustrated catalogs cover Thor universal electric, mining and contractors' tools. Circular JE-1148 covers Copper Line tools including ¼ and ⅛-in. drills and new stands for use with them. Circular JE-1139 describes model 35 sinker rock drill; and circular JE-1132 catalogs mining tools including sinker leg, air bar feed, pneumatic column and stoper leg.

89. Worm Gear Reduction Units

Cleveland Worm & Gear Co.—16-page illustrated bulletin No. 514 discusses Speedaire fan cooled type worm gear reduction units. Useful data presented include instructions on planning installations, comparative performance curves, design features, unit rating tables and dimensions of standard units.

90. Welding Electrodes

Hobart Bros. Co.—16-page illustrated catalog No. EW-149 contains description, application data, welding procedure, mechanical properties and specifications of complete line of electrodes. These include mild steel, special purpose, cast iron, hard surfacing, moly-manganese, nickel-manganese, aluminum and other types.

91. Alloy Steel Fabrication

Graver Tank & Mfg. Co.—4-page illustrated folder "The Hands of Skill" discusses facilities for fabrication of vessels of virtually any size in gages of No. 12 and heavier and in finishes up to No. 4. These can be of stainless steel, stainless clad, nickel, nickel clad, Monel, Everdur and aluminum.

92. Synchronous Motors

General Electric Co.—8-page illustrated bulletin GEA-5426 is devoted to Tri-Clad high speed synchronous motors and lists various applications of these units that include driving pumps, grinders, compressors, saws, beaters, fans and generators. Covered are three-phase type TS and two-phase type QS motors in ratings from 20 to 1500 hp at 60-cycle speeds of 1800 rpm.

93. Flash Butt Welding

American Welding & Mfg. Co.—20-page illustrated booklet CA-50-75 tells advantages of flash butt welding by controlled techniques. Products and subassemblies ranging in diameter from 4 to 100 in. and up to 16 miles in length are described. Typical product applications are shown, and metals which have been successfully flash butt welded are cited.

94. Air Diffuser

Anemostat Corp. of America—68-page illustrated selection manual tells how to select proper air diffusers and how to calculate air volume for specific applications. Also given are capacity and neck velocities, radii of diffusion, static pressures and dimensions.

95. Gear Motors

Janette Mfg. Co. — 4-page illustrated bulletin No. 3-100 describes major features and depicts various types of standard fractional and integral horsepower gear motors available from stock. Basic design of these units centers around worm and combination worm-and-planetary gearing to provide compact low-speed power unit.

96. Dust Collectors

Aget-Detroit Co.—Bulletin 610 is designed to aid in rapid selection of correct size of unit type dust collector for any location requiring capacity from 200 to 3600 cfm. Among tabulated comparison of all units in line are general recommendations as to wheel sizes that any single unit will handle.

97. Welding Alloys

Eutectic Welding Alloys Corp.—Illustrated wall chart measuring about 2 by 3 ft lists over 100 EutecRods and EutecTrodes with their standard sizes. Type of joint for which each rod is suitable, metal on which it is to be used, bonding temperature, tensile strength, Brinell hardness, degree of color match, electrical conductivity, and other technical data are given.

98. Direct Current Generators

Allis-Chalmers Mfg. Co.—20-page illustrated bulletin 05B7229 deals with construction of direct current generators larger than 150 kw or 0.3 kw per rpm. These include two and three-wire generators and exciters, both engine and coupled type. Space is devoted to explanation of Frog-Leg armature winding.

99. Steel Beams

Jones & Laughlin Steel Corp.—24-page illustrated booklet AD 156 entitled "Skyscraper Construction for Every Building" discusses advantages of Junior Beam lightweight hot-rolled steel structurals for supporting floors and roofs in light-occupancy buildings, industrial plants and residences. Data are presented on roof purlin and end connections, spacing, accessories, and functions and properties of structural tees cut from beams.

100. Induction Heaters

Electric Arc, Inc. — 2-page illustrated catalog sheet is handy reference chart on induction heaters and control instruments for preheating before welding and stress relieving after welding. Seven models are depicted and their features described.

FOR MORE INFORMATION USE ONE OF THESE CARDS . .

STEEL Numbers				
1	21	41	61	81
2	22	42	62	82
3	23	43	63	83
4	24	44	64	84
5	25	45	65	85
6	26	46	66	86
7	27	47	67	87
8	28	48	68	88
9	29	49	69	89
10	30	50	70	90
11	31	51	71	91
12	32	52	72	92
13	33	53	73	93
14	34	54	74	94
15	35	55	75	95
16	36	56	76	96
17	37	57	77	97
18	38	58	78	98
19	39	59	79	99
20	40	60	80	100

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Market Summary

STEELMAKING operations are expected to rise sharply this week. The national ingot rate likely will hit around 85 per cent of capacity over the next few days. Indications are pre-coal-strike curtailment pace, over 90 per cent, will be attained well before end of the month. It will take at least two weeks from ending of the coal controversy for all strike-idled blast furnaces, coke ovens, open hearths and bessemer converters to get back into full production. Last week, resumption of many open hearths and converters was delayed by shortages of hot metal. This will be promptly corrected with many strike-idled blast furnaces quickly resuming production.

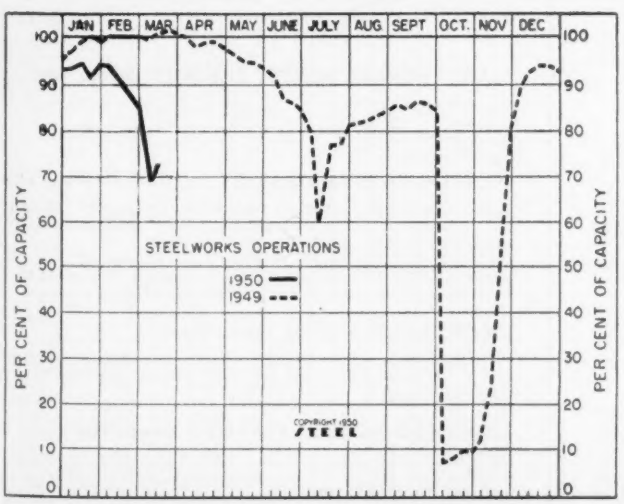
OPERATIONS—Sudden ending of the coal labor impasse prevented the national ingot rate from falling as low as had been predicted. At that, it dropped to 69 per cent, down 25 points from the beginning of February. Well over 1 million tons of steel will be lost directly because of the coal strike before pre-curtailment operations are regained. Last week the national ingot rate advanced 4 points to 73 per cent of capacity.

DISTRICT RATES—Recovery got under way much quicker at some production points than at others. The Pittsburgh rate went up 6 points to 58 per cent. Eastern Pennsylvania operations rose 13 points to 72. At Cleveland an advance of 3½ points to 97 was scored. The Buffalo rate rose 5 points to 98.5. Wheeling operations went up 1 point to 90, and Detroit 6 points to 104. A decline of 3½ points to 83 was reported at Chicago, while Birmingham dropped 13 points to 42 and Cincinnati 4 points to 85. Youngstown operations held unchanged at the revised rate of 50 per cent.

SUPPLY—Loss of steel production the past month or so is intensifying supply problems in the various products. Interruptions in rolling schedules pushed shipment promises on sheets and strip further into the future. It now is certain mills will carry heavy tonnage arrearages into second quarter, and scheduled shipments in that period will extend into third quarter. Tightness in sheets is outstanding but over the past several weeks stringency has developed in carbon bars.

DEMAND—In the main, the pattern of current demand is much the same as before the coal crisis. High consumer pressure prevails for the light, flat-rolled products and tin plate. Pipe follows next in point of stringency, followed by bars, shapes and plates. Requirements for the heavier products are noticeably more pressing, especially carbon bars. Deliveries in all of the heavier items have become further extended, not only because of the disruption of rolling mill schedules during the coal strike, but because of better consumer interest as well. Steel distributors anticipate larger volume this month though it will not equal their expectations prior to the ending of the coal stoppage. Pressure from consumers shows signs of increasing in various directions and a marked rise in conversion ingot tonnage is reported.

PRICES—Except for minor adjustments by individual producers, steel prices are unchanged. A leading eastern producer announced new size extras on hot-rolled strip, effective Mar. 6. Expected rise of 25 to 50 cents per ton in coal prices as result of the strike settlement is likely to bring a corresponding hike in coke. Whether such increase will be absorbed by pig iron producers is a moot question. It will be recalled pig iron was one of the few products not increased in price last December. STEEL's weighted index on finished steel is unchanged at 156.13, as is the arithmetical price composite at $93.18. Pig iron composites also are steady with No. 2 foundry, $46.47, basic, $45.97 and malleable, $47.27. Steelmaking scrap composite is up slightly to $27.50.



DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Mar. 11	Change	Same Week 1949	Same Week 1948
Pittsburgh	58	+ 6*	99.5	96
Chicago	83	— 3.5*	100.5	94
Eastern Pa.	72	+13	98	92
Youngstown	50	0*	105	103
Wheeling	90	+ 1	95	92.5
Cleveland	97	+ 3.5*	102	95.5
Buffalo	98.5	+ 5	104	101
Birmingham	42	—13	100	100
New England	80	0	87	85
Cincinnati	85	— 4	99	106
St. Louis	84.5	0	82.5	77.5
Detroit	104	+ 6*	106	104
Western	81	0	100.5	..
Estimated national rate	73	+ 4*	100.5	95.5

Based on weekly steelmaking capacity of 1,906,267 net tons for 1950; 1,843,516 net tons for 1949; 1,802,476 net tons for 1948.
*Changed from revised rate.

News Summary—p. 61 Production-Engineering News—p. 91

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Composite Market Averages

	Mar. 9 1950	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av.=100)	156.13	156.13	156.13	154.85	100.65
Index in cents per lb.	4.230	4.230	4.230	4.195	2.727
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT	$93.18	$93.18	$93.00	$97.32	$57.55
No. 2 Fdry Pig Iron, GT	46.47	46.47	46.47	46.63	24.67
Basic Pig Iron, GT	45.97	45.97	45.97	46.22	24.00
Malleable Pig Iron, GT	47.27	47.27	47.27	47.34	25.29
Steelmaking Scrap, GT	27.50	27.33	27.42	36.33	19.17

Weighted finished steel index based on average shipments and prices of the following 14 representative products during 5-year base period 1935-39: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No.1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	Mar. 9 1950	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	3.45	3.45	3.45	3.35–55	2.15
Bars, H.R., Chicago	3.45	3.45	3.45	3.35	2.15
Bars, C.F., Pittsburgh	4.10–15	4.10–15	4.10–15	3.95–4.25	2.65
Shapes, Std., Pittsburgh	3.40	3.40	3.40	3.25–30	2.10
Shapes, Std., Chicago	3.40	3.40	3.40	3.25	2.10
Plates, Pittsburgh	3.50	3.50	3.50	3.40–60	2.20
Plates, Chicago	3.50	3.50	3.50	3.40	2.20
Plates, Coatesville, Pa.	3.60	3.60	3.60	3.75	2.20
Plates, Sparrows Point, Md.	3.50	3.50	3.50	3.45	2.20
Plates, Claymont, Del.	3.60	3.60	3.60	3.95	2.20
Sheets, H.R., Pittsburgh	3.35	3.35	3.35	3.25–30	2.20
Sheets, H.R., Chicago	3.35	3.35	3.35	3.25	2.20
Sheets, C.R., Pittsburgh	4.10	4.10	4.10	4.00	3.05
Sheets, C.R., Chicago	4.10	4.10	4.10	4.00	3.05
Sheets, C.R., Detroit	4.30	4.30	4.30	4.20	3.15
Sheets, Galv., Pittsburgh	4.40	4.40	4.40	4.40	3.65
Strip, H.R., Pittsburgh	3.25	3.25	3.25	3.25–70	2.10
Strip, H. R., Chicago	3.25	3.25	3.25	3.25–30	2.10
Strip, C.R., Pittsburgh	4.15	4.15	4.15	4.00–75	2.80
Strip, C.R., Chicago	4.30	4.30	4.30	4.00–25	2.90
Strip, C.R., Detroit	4.35–40	4.35–40	4.35–40	4.20–50	2.90
Wire, Basic, Pittsburgh	4.50	4.50	4.50	4.15–50	2.60
Nails, Wire, Pittsburgh	5.30	5.30	5.30	5.15–6.30	2.80
Tin plate, box, Pittsburgh	$7.50	$7.50	$7.50	$7.75	$5.00

SEMIFINISHED

Billets, forging, Pitts. (NT)	$63.00	$63.00	$63.00	$61.00	$40.00
Sheet bar, mill (NT)	57.00–58.00	57.00–58.00	57.00–58.00	67.00	34.00
Wire rods, 7/32-⅜", Pitts.	3.85	3.85	3.85	3.40–4.15	2.00

PIG IRON, Gross Ton

Bessemer, Pitts.	$47.00	$47.00	$47.00	$47.00	$25.50
Basic, Valley	46.00	46.00	46.00	46.00	24.50
Basic, del. Phila.	49.44	49.44	49.44	50.30	26.34
No. 2 Fdry, Pitts.	46.50	46.50	46.50	46.50	25.00
No. 2 Fdry, Chicago	46.50	46.50	46.50	46.00–50	25.00
No. 2 Fdry, Valley	46.50	46.50	46.50	46.50	25.00
No. 2 Fdry, del. Phila.	49.94	49.94	49.94	50.80	26.84
No. 2 Fdry, Birm.	42.38	42.38	42.38	43.38	21.38
No. 2 Fdry. (Birm.) Del Cin.	49.08	49.08	49.08	49.43	25.06
Malleable, Valley	46.50	46.50	46.50	46.50	25.00
Malleable, Chicago	46.50	46.50	46.50	46.50	25.00
Charcoal, Lyles, Tenn.	60.00	60.00	60.00	66.00	33.00
Ferromanganese, Etna, Pa.	175.00	175.00	175.00	163.00	140.33*

* Delivered, Pittsburgh.

SCRAP, Gross Ton

No. 1 Heavy Melt. Pitts.	$31.00	$31.00	$31.25	$37.00	$20.00
No. 1 Heavy Melt, E. Pa.	23.50	23.50	23.50	38.00	18.75
No. 1 Heavy Melt, Chicago	27.50	27.50	27.50	34.00	18.75
No. 1 Heavy Melt. Valley	31.75	31.75	31.25	37.75	20.00
No. 1 Heavy Melt, Cleve.	28.25	28.25	28.25	35.25	19.50
No. 1 Heavy Melt. Buffalo	28.25	28.25	27.75	38.75	19.25
Rails, Rerolling, Chicago	40.50	40.50	39.50	45.75	22.25
No. 1 Cast, Chicago	41.00	41.00	40.50	41.50	20.00

COKE, Net Ton

Beehive, Furn., Connlsvl.	$13.25	$13.25	$13.25	$14.50	$7.00
Beehive, Fdry., Connlsvl.	15.50	15.50	15.50	17.00	7.75
Oven Fdry., Chicago	21.00	21.00	21.00	20.40	13.35

NONFERROUS METALS

Copper, del. Conn.	18.50	18.50	18.50	23.50	12.00
Zinc, E. St. Louis	9.75	9.75	9.75	17.50	8.25
Lead, St. Louis	11.80	11.80	11.80	19.30–35	6.35
Tin, New York	74.625	74.50	74.50	103.00	52.00
Aluminum, del.	17.00	17.00	17.00	17.00	15.00
Antimony, Laredo, Tex.	24.50	24.50	27.25	38.50	14.50
Nickel, refinery, duty paid	40.00	40.00	40.00	40.00	35.00

Pig Iron

For key to producing companies, turn next page.
Minimum delivered prices do not include 3% federal tax.

PIG IRON, Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem, Pa. B2	$48.00	$48.50	$49.00	$49.50
Newark, del	50.63	51.13	51.63	52.13
Brooklyn, N.Y., del.	....	52.79	53.29	....
Birmingham District				
Birmingham R2	41.88	42.38	....	....
Birmingham S9	41.88	42.38	....	....
Woodward, Ala W15	41.88	42.38	....	....
Cincinnati, del	....	49.08	....	....
Buffalo District				
Buffalo H1, R2	46.00	46.50	47.00	....
Tonawanda, N.Y., W12	46.00	46.50	47.00	....
N. Tonawanda, N.Y., T9	....	46.50	47.00	....
Boston, del	55.26	55.76	56.20	....
Rochester, N.Y., del.	48.63	49.13	49.63	....
Syracuse, N.Y., del.	49.58	50.08	50.58	....
Chicago District				
Chicago I-3	46.00	46.50	46.50	47.00
Gary, Ind. C3	46.00	....	46.50	....
IndianaHarbor, Ind. I-2	46.00	....	46.50	....
So. Chicago, Ill. W14 Y1	46.00	46.50	46.50	....
So. Chicago, Ill C3	46.00	....	46.50	47.00
Milwaukee, del.	47.89	48.39	48.39	48.89
Muskegon, Mich., del.	....	51.98	51.98	....
Cleveland District				
Cleveland A7	46.00	46.50	46.50	47.00
Cleveland R2	46.00	46.50	46.50	....
Akron, del. from Cleve.	48.39	48.89	48.89	49.39
Lorain, O. N3	46.00	....	....	47.00
Duluth I-3	....	....	46.50	....
Erie, Pa. I-3	46.00	46.50	46.50	47.00
Everett, Mass. E1	....	50.50	51.00	....
Fontana, Calif. K1	52.00	52.50	....	....
Geneva, Utah G1	46.00	46.50	....	....
Seattle, Tacoma, Wash., del.	....	54.20	....	....
Portland, Oreg., del.	....	54.20	....	....
LosAngeles, SanFrancisco, del	53.70	54.20	....	....
GraniteCity, Ill. M10	47.90	48.40	48.90	....
St. Louis, del (incl. tax)	48.65	49.15	49.65	....
Ironton, Utah C11	46.00	46.50	....	....
Minnequa, Colo. C10	47.00	47.50	47.50	....
Pittsburgh District				
NevilleIsland, Pa. P6	46.00	46.50	46.50	47.00
Pitts, N.&S. sides, Ambridge, Aliquippa, del.	47.19	47.69	47.69	48.19
McKeesRock, del.	46.95	47.45	47.45	47.95
Lawrenceville, Homestead, McKeesport, Monaca, del.	47.44	47.94	47.94	48.44
Verona, del	47.90	48.40	48.40	48.90
Brackenridge, del.	48.13	48.63	48.63	49.13
Bessemer, Pa. C3	46.00	....	46.50	47.00
Clairton, Rankin, So. Duquesne, Pa. C3	46.00	....	....	....
McKeesport, Pa. N3	46.00	....	....	47.00
Sharpsville, Pa. S6	46.00	46.50	46.50	47.00
Steelton, Pa. B2	48.00	48.50	49.00	49.50
Steubenville, O. W10	46.00	....	....	....
Struthers, O. S16	46.00	....	....	....
Swedeland, Pa. A3	48.00	48.50	49.00	49.50
Philadelphia, del.	49.44	49.94	50.44	50.94
Toledo, O. I-3	46.00	46.50	46.50	47.00
Cincinnati, del.	51.01	51.51	....	....
Troy, N.Y., R2	48.00	48.50	49.00	49.50
Youngstown District				
Hubbard, O. Y1	46.00	46.50	46.50	....
Youngstown C3	46.00	....	....	47.00
Youngstown Y1	46.00	46.50	46.50	47.00
Mansfield, O. del.	50.26	50.76	50.76	51.26

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1.75-2.25%

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1%, or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1 for each 0.5% Si to 11.50%)

Jackson, O. G2, J1	$57.00
Buffalo H1	58.25

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for 0.045% max. P)

NiagaraFalls, N.Y. P15	$71.50
Keokuk, Iowa, Openhearth & Fdry, frt. allowed K2	77.00
Keokuk, Iowa, OH & Fdry., 12½ lb. piglets, frt, allowed K2.	82.00
Wenatchee, Wash., OH & Fdry, frt. allowed K2	77.00

CHARCOAL PIG IRON, Gross Ton

(Low phos. semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 & 6)

LylesTenn. T3	$60.00

LOW PHOSPHOROUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$51.00
Steelton, Pa. B2	54.00
Philadelphia delivered	57.00
Troy, N.Y. R2	54.00

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Semifinished and Finished Steel Products

Mill prices as reported to STEEL, Mar. 9, 1950; cents per pound unless otherwise noted. Changes shown in italics.
Code numbers following mill points indicate producing company; key on next two pages.

INGOTS, Carbon, Forging (NT)
Detroit R7 ..... $50.00
Munhall,Pa. C3 ..... 50.00

INGOTS, Alloy (NT)
Detroit R7 ..... $51.00
Houston,Tex. S5 ..... 59.00
Midland,Pa. C18 ..... 51.00
Munhall,Pa. C3 ..... 51.00
SoDuquesne,Pa. C3 ... 51.00

BILLETS, BLOOMS & Slabs Carbon, Rerolling (NT)
Bessemer,Pa. C3 .... $53.00
Clairton,Pa. C3 ..... 53.00
Conshohocken,Pa. A3 .. 58.00
Ensley,Ala. T2 ..... 53.00
Fairfield,Ala. T2 ..... 53.00
Fontana,Cal. K1 ..... 72.00
Gary,Ind. C3 ..... 53.00
Johnstown,Pa. B2 .... 53.00
Lackawanna,N.Y. B2.. 53.00
Munhall,Pa. C3 ..... 53.00
Sharon,Pa. S3 ..... 57.00
SoChicago,Ill. C3 ..... 53.00
So.Duquesne,Pa. C3 .. 53.00

Carbon, Forging (NT)
Bessemer,Pa. C3 .... $63.00
Buffalo R2 ..... 63.00
Canton,O. R2 ..... 63.00
Clairton,Pa. C3 ..... 63.00
Cleveland R2 ..... 63.00
Conshohocken,Pa. A3.. 65.00
Detroit R7 ..... 63.00
Ensley,Ala. T2 ..... 63.00
Fairfield,Ala. T2 ..... 63.00
Fontana,Calif. K1 ..... 85.00
Gary,Ind. C3 ..... 63.00
Geneva,Utah G1 ..... 63.00
Houston,Tex. S5 ..... 71.00
Ind.Harbor,Ind. I-2 ... 63.00
Johnstown,Pa. B2 .... 63.00
Lackawanna,N.Y. B2 .. 63.00
LosAngeles B3 ..... 82.00
Munhall,Pa. C3 ..... 63.00
Seattle B3 ..... 82.00
So.Chicago C3,R2,W14 . 63.00
So.Duquesne,Pa. C3 ... 63.00
So.SanFrancisco B3 ... 82.00
Warren,O. C17 ..... 63.00

Alloy (NT)
Bethlehem,Pa. B2 .... $66.00
Buffalo R2 ..... 66.00
Canton,O. R2, T7 .... 66.00
Conshohocken,Pa. A3.. 68.00
Detroit R7 ..... 66.00
Fontana,Calif. K1 ..... 85.00
Gary,Ind. C3 ..... 66.00
Houston,Tex. S5 ..... 74.00
Ind.Harbor,Ind. Y1 ... 66.00
Johnstown,Pa. B2 .... 66.00
Lackawanna,N.Y. B2 .. 66.00
LosAngeles B3 ..... 86.00
Massillon,O. R2 ..... 66.00
Midland,Pa. C18 ..... 66.00
Munhall,Pa. C3 ..... 66.00
Sharon,Pa. S3 ..... 66.00
So.Chicago C3,R2,W14. 66.00
So.Duquesne,Pa. C3 .. 66.00
Warren,O. C17 ..... 66.00
Youngstown Y1 ..... 66.00

SHEET BARS (NT)
Mansfield,O. E6 ..... $58.00
Sharon,Pa. S3 ..... 57.00

ROUNDS, SEAMLESS TUBE (NT)
Canton,O. R2 ..... $76.00
Cleveland R2 ..... 76.00
Ind.Harbor,Ind. I-2 ... 76.00
Massillon,O. R2 ..... 76.00
So.Chicago,Ill. R2 .... 76.00

SKELP
Aliquippa,Pa. J5 ..... 3.25
Munhall,Pa. C3 ..... 3.15
Warren,O. R2 ..... 3.15
Youngstown C3, R2 ... 3.15

WIRE RODS
AlabamaCity,Ala. R2 .. 3.85
Buffalo W12 ..... 3.85
Cleveland A7 ..... 3.85
Donora,Pa. A7 ..... 3.85
Fairfield,Ala. T2 ..... 3.85
Houston,Tex. S5 ..... 4.25
Ind.Harbor,Ind. Y1 ... 3.85
Johnstown,Pa. B2 ..... 3.85
Joliet,Ill. A7 ..... 3.85
LosAngeles B3 ..... 4.65
Minnequa,Colo. C10 ... 4.10
Monessen,Pa. P7 ..... 3.85
No.Tonawanda,N.Y. B11. 4.10
Pittsburg,Calif. C11 ... 4.50
Portsmouth,O. P12 .... 3.85
Roebling,N.J. R5 ..... 3.95
So.Chicago,Ill. R2 .... 3.85
SparrowsPoint B2 ..... 3.95
Sterling,Ill.(1) N15 ... 3.85
Struthers,O. Y1 ..... 3.85
Torrance,Calif. C11 .... 4.65

STRUCTURALS
Carbon Steel Stand. Shapes
Aliquippa,Pa. J5 ..... 3.40
Bessemer,Ala. T2 ..... 3.40
Bethlehem,Pa. B2 ..... 3.45
Clairton,Pa. C3 ..... 3.40
Fairfield,Ala. T2 ..... 3.40
Fontana,Calif. K1 ..... 4.00
Gary,Ind. C3 ..... 3.40
Geneva,Utah G1 ..... 3.40
Houston,Tex. S5 ..... 3.80
Ind.Harbor,Ind. I-2 ... 3.40
Johnstown,Pa. B2 ..... 3.45
KansasCity,Mo. S5 .... 4.00
Lackawanna,N.Y. B2 .. 3.45
LosAngeles B3 ..... 4.00
Minnequa,Colo. C10 ... 3.75
Munhall,Pa. C3 ..... 3.40
Niles,Calif.(22) P1 .... 4.02
Phoenixville,Pa. P4 .... 3.30
Portland,Oreg. O4 ..... 3.90
Seattle B3 ..... 4.05
So.Chicago,Ill. C3, W14. 3.40
So.SanFrancisco B3 ... 3.95
Torrance,Calif. C11 .... 4.00
Weirton,W.Va. W6 .... 3.40

Alloy Stand. Shapes
Clairton,Pa. C3 ..... 4.05
Fontana,Calif. K1 ..... 5.25
Munhall,Pa. C3 ..... 4.05
So.Chicago,Ill. C3 ..... 4.05

H.-S. Low-Alloy Stand. Shapes
Aliquippa,Pa. J5 ..... 5.15
Bessemer,Ala. T2 ..... 5.15
Bethlehem,Pa.(14) B2.. 5.20
Clairton,Pa. C3 ..... 5.15
Fairfield,Ala. T2 ..... 5.15
Fontana,Calif. K1 ..... 5.75
Gary,Ind. C3 ..... 5.15
Ind.Harbor,Ind. I-2, Y1. 5.15
Johnstown,Pa. B2 ..... 5.20
Lackawanna,N.Y.(14)B2 5.20
Munhall,Pa. C3 ..... 5.15
So.Chicago,Ill. C3 ..... 5.15
Struthers,O. Y1 ..... 5.15

Wide Flange
Bethlehem,Pa. B2 ..... 3.45
Lackawanna,N.Y. B2 .. 3.45
Munhall,Pa. C3 ..... 3.40
So.Chicago,Ill. C3 ..... 3.40

H-S., L-A. Wide Flange
Munhall,Pa. C3 ..... 5.10
So.Chicago,Ill. C3 ..... 5.10

SHEET STEEL PILING
Ind.Harbor,Ind. I-2 ... 4.20
Lackawanna,N.Y. B2 .. 4.20
Munhall,Pa. C3 ..... 4.20
So.Chicago,Ill. C3 ..... 4.20
Weirton,W.Va. W6 .... 4.20

PLATES, Carbon Steel
AlabamaCity,Ala. R2 .. 3.50
Aliquippa,Pa. J5 ..... 3.50
Ashland,Ky.(15) A10 .. 3.50
Bessemer,Ala. T2 ..... 3.50
Clairton,Pa. C3 ..... 3.50
Claymont,Del. W16 .... 3.60
Cleveland J5, R2 ..... 3.50
Coatesville,Pa. L7 ..... 3.60
Conshohocken,Pa. A3 .. 3.60
Ecorse,Mich. G5 ..... 3.75
Fairfield,Ala. T2 ..... 3.50
Fontana,Calif. K1 ..... 4.10
Gary,Ind. C3 ..... 3.50
Geneva,Utah G1 ..... 3.50
Harrisburg,Pa. C5 ..... 3.50
Houston,Tex. S5 ..... 3.90
Ind.Harbor,Ind. I-2, Y1. 3.50
Johnstown,Pa. B2 ..... 3.50
Lackawanna,N.Y. B2 .. 3.50
Minnequa, Colo. C10 ... 4.30
Munhall,Pa. C3 ..... 3.50
Pittsburgh J5 ..... 3.50
Seattle B3 ..... 4.40
Sharon,Pa. S3 ..... 3.50
So.Chicago,Ill. C3, W14. 3.50
SparrowsPoint,Md. B2.. 3.50
Steubenville,O. W10 ... 3.50
Warren,O. R2 ..... 3.50
Weirton,W.Va. W6 .... 3.50
Youngstown C3, R2, Y1. 3.50

PLATES (Universal Mill)
Fontana,Calif. K1 .... 4.40

PLATES, Carbon, A.R.
Fontana,Calif. K1 ..... 5.25

PLATES, Open-Hearth Alloy
Coatesville,Pa. L7 ..... 4.50
Conshohocken,Pa. A3 .. 4.40
Fontana,Calif. K1 ..... 5.40
Gary,Ind. C3 ..... 4.40
Johnstown,Pa. B2 ..... 4.40
Munhall,Pa. C3 ..... 4.40
Sharon,Pa. S3 ..... 4.40
So.Chicago,Ill. C3 ..... 4.40
SparrowsPoint,Md. B2.. 4.40

PLATES, Wrought Iron
Economy,Pa. B14 ..... 7.85

PLATES, High-Strength Low-Alloy
Aliquippa,Pa. J5 ..... 5.35
Bessemer,Ala. T2 ..... 5.35
Clairton,Pa. C3 ..... 5.35
Cleveland J5, R2 ..... 5.35
Conshohocken,Pa. A3 .. 5.35
Ecorse,Mich. G5 ..... 5.60
Fairfield,Ala. T2 ..... 5.35
Fontana,Calif. K1 ..... 5.95
Gary,Ind. C3 ..... 5.35
Geneva,Utah G1 ..... 5.35
Houston,Tex. S5 ..... 5.60
Ind.Harbor,Ind. I-2, Y1. 5.35
Johnstown,Pa. B2 ..... 5.35
Munhall,Pa. C3 ..... 5.35
Pittsburgh J5 ..... 5.35
Sharon,Pa. S3 ..... 5.35
So.Chicago,Ill. C3 ..... 5.35
SparrowsPoint,Md. B2 .. 5.35
Warren,O. R2 ..... 5.35
Youngstown Y1 ..... 5.35

FLOOR PLATES
Cleveland J5 ..... 4.55
Conshohocken,Pa. A3 .. 4.55
Harrisburg,Pa. C5 ..... 4.55
Ind.Harbor,Ind. I-2 .... 4.55
Munhall,Pa. C3 ..... 4.55
So.Chicago,Ill. C3 ..... 4.55

PLATES, Ingot Iron
Asland,c.l.(15) A10 .... 3.75
Ashland,lcl(15) A10 ... 4.25
Cleveland,cl R2 ..... 4.10
Warren,O.,cl R2 ..... 4.10

BARS, Hot-Rolled Carbon
AlabamaCity,Ala. R2 .. 3.45
Aliquippa,Pa. J5 ..... 3.45
Alton,Ill.(1) L1 ..... 3.45
Ashland,Ky.(17) A10 .. 3.45
Atlanta,Ga. A11 ..... 3.60
Bessemer,Ala. T2 ..... 3.45
Buffalo R2 ..... 3.45
Canton,O. R2 ..... 3.45
Clairton,Pa. C3 ..... 3.45
Cleveland R2 ..... 3.45
Ecorse,Mich. G5 ..... 3.65
Emeryville,Calif. J7 ... 4.20
Fairfield,Ala. T2 ..... 3.45
Fontana,Calif. K1 ..... 4.10
Gary,Ind. G3 ..... 3.45
Houston,Tex. S5 ..... 3.85
Ind.Harbor,Ind. I-2, Y1. 3.45
Johnstown,Pa. B2 ..... 3.45
KansasCity,Mo. S5 .... 4.05
Lackawanna,N.Y. B2 .. 3.45
LosAngeles B3 ..... 4.15
Marion,O. P11 ..... 3.35
Midland,Pa. C18 ..... 3.45
Milton,Pa. B6 ..... 3.45
Minnequa,Colo. C10 ... 3.85
Niles,Calif. P1 ..... 4.17
N.Tonawanda,N.Y.B11 .. 3.45
Pittsburg,Calif. C11 ... 4.15
Pittsburgh J5 ..... 3.45
Portland,Oreg. O4 ..... 4.20
Seattle B3, N14 ..... 4.20
SoChicago C3, R2, W14. 3.45
So.Duquesne,Pa. C3 ... 3.45
S.SanFran.,Cal. B3 .... 4.20
Struthers,O. Y1 ..... 3.45
Torrance,Calif. C11 .... 4.15
Weirton,W.Va. W6 .... 3.45
Youngstown C3, R2 .... 3.45

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 ..... 3.45
Atlanta A11 ..... 3.60
Johnstown,Pa. B2 ..... 3.45
Lackawanna,N.Y. B2 .. 3.45
Niles,Calif. P1 ..... 4.17
Pittsburgh(23) J5 ..... 3.45
Portland,Oreg. O4 ..... 4.20
SanFrancisco S7 ..... 4.00
Weirton,W.Va. W6 .... 3.45

BAR SIZE ANGLES; H.R.CARBON
Bethlehem,Pa. B2 ..... 3.65

BARS, Hot-Rolled Alloy
Bethlehem,Pa. B2 ..... 3.95
Buffalo R2 ..... 3.95
Canton,O. R2, T7 ..... 3.95
Clairton,Pa. C3 ..... 3.95
Ecorse,Mich. G5 ..... 4.25
Fontana,Calif. K1 .... 4.95
Gary,Ind. C3 ..... 3.95
Houston,Tex. S5 ..... 4.35
Ind.Harbor,Ind. I-2, Y1. 3.95
Johnstown,Pa. B2 ..... 3.95
KansasCity,Mo. S5 .... 4.55
Lackawanna,N.Y. B2 .. 3.95
LosAngeles B3 ..... 5.00
Massillon,O. R2 ..... 3.95
Midland,Pa. C18 ..... 3.95
So.Chicago C3, R2, W14. 3.95
So.Duquesne,Pa. C3 ... 3.95
Struthers,O. Y1 ..... 3.95
Warren,O. C17 ..... 3.95
Youngstown C3 ..... 3.95

BARS, Hot-Rolled Ingot Iron
Ashland,Ky.(17) A10 .. 3.70

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy
Aliquippa,Pa. J5 ..... 5.20
Bessemer,Ala. T2 ..... 5.20
Bethlehem,Pa. B2 ..... 5.20
Clairton,Pa. C3 ..... 5.20
Cleveland R2 ..... 5.20
Ecorse,Mich. G5 ..... 5.40
Fairfield,Ala. T2 ..... 5.20
Fontana,Calif. K1 .... 6.25
Gary,Ind. C3 ..... 5.20
Ind.Harbor,Ind. I-2, Y1-5.20
Johnstown,Pa. B2 ..... 5.20
Lackawanna,N.Y. B2 .. 5.20
Pittsburgh J5 ..... 5.20
So.Duquesne,Pa. C3 ... 5.20
Struthers,O. Y1 ..... 5.20
Youngstown C3 ..... 5.20

BARS, Cold-Finished Carbon
Aliquippa,Pa. K5 ..... 4.15
Ambridge,Pa. W18 .... 4.15
BeaverFalls,Pa. M12,R2.4.15
Buffalo B5 ..... 4.15
Camden,N.J. P13 ..... 4.63
Carnegie,Pa. C12 ..... 4.15
Chicago W18 ..... 4.15
Cleveland A7, C20 .... 4.15
Detroit P17 ..... 4.30
Donora,Pa. A7 ..... 4.15
Ecorse,Mich. G5 ..... 4.35
Elyria,O. W8 ..... 4.15
FranklinPark,Ill. N5 .. 4.15
Gary,Ind. R2 ..... 4.15
Hammond,Ind. L2, M13. 4.15
Hartford,Conn. R2 .... 4.55
Harvey,Ill. B5 ..... 4.15
LosAngeles R2 ..... 5.55
Mansfield,Mass. B5 .... 4.55
Massillon,O. R2, R8 ... 4.15
Midland,Pa. C18 ..... 4.15
Monaca,Pa. S17 ..... 4.15
Newark,N.J. W18 ..... 4.55
Plymouth,Mich. P5 .... 4.40
Pittsburgh J5 ..... 4.10
Putnam,Conn. W18 .... 4.55
Readville,Mass. C14 .... 4.55
St.Louis,Mo. M5 ..... 4.55
So.Chicago,Ill. W14 .... 4.15
SpringCity,Pa.(5) K3 .. 4.55
Struthers,O. Y1 ..... 4.15
Waukegan,Ill. A7 ..... 4.15
Youngstown F3, Y1 .... 4.15

BARS, Cold-Finished Alloy
Aliquippa,Pa. K5 ..... 4.90
Ambridge,Pa. W18 .... 4.90
BeaverFalls,Pa. M12 .. 4.90
Bethlehem,Pa. B2 ..... 4.90
Buffalo B5 ..... 4.90
Canton,O. R2, T7 ..... 4.90
Carnegie,Pa. C12 ..... 4.90
Chicago W18 ..... 4.90
Cleveland A7, C20 .... 4.90
Detroit P17 ..... 5.05
Donora,Pa. A7 ..... 4.90
Elyria,O. W8 ..... 4.90
Gary,Ind. R2 ..... 4.90
Hammond,Ind. L2, M13. 4.90
Hartford,Conn. R2 .... 5.20
Harvey,Ill. B5 ..... 4.90
Lackawanna,N.Y. B2 .. 4.90
Mansfield,Mass. B5 .... 5.20
Massillon,O. R2, R8 ... 4.90
Midland,Pa. C18 ..... 4.90
Monaca,Pa. S17 ..... 4.90
Newark,N.J. W18 ..... 5.20
Plymouth,Mich. P5 .... 5.10
So.Chicago,Ill. R2, W14. 4.90
Struthers,O. Y1 ..... 4.90
Waukegan,Ill. A7 ..... 4.90
Warren,O. C17 ..... 4.90
Worcester,Mass. A7 .... 5.20
Youngstown F3, Y1.... 4.90

RAIL STEEL BARS
ChicagoHts.,Ill.(3) I-2.. 3.30
ChicagoHts.,Ill.(4) I-2.. 3.45
FortWorth,Tex.(26) T4.. 4.33
Huntngtn,W.Va.(3) W7.. 3.45
Moline,Ill.(3) R2 ..... 3.40
Williamsport(2,3) S19 .. 3.45

BARS, Wrought Iron
Economy,Pa.(S.R.) B14.9.50
Economy,Pa.(D.R.)B14 11.00
Economy(Staybolt) B14.11.30
McK.Rks.(S.R.) L5 .... 8.60
McK.Rks.(D.R.) L5 ..11.25
McK.Rks.(Staybolt) L5.12.75

BARS, Reinforcing (Fabricated; to Consumers)
Huntington,W.Va. W7 .. 4.50
Johnstown, ¼-1" B2 .. 4.35
LosAngeles B3 ..... 5.00
Marion,O. P11 ..... 4.25
Seattle B3, N14 ..... 5.10
So.SanFrancisco B3 ... 5.00
SparrowsPt., ¼-1" B2 .. 4.35
Williamsport,Pa. S19 .. 4.35

BARS, Reinforcing (Fabricators)
AlabamaCity,Ala. R2 .. 3.45
Alton,Ill.(6) L1 ..... 3.45
Atlanta,Ga. A11 ..... 3.60
Buffalo R2 ..... 3.45
Cleveland R2 ..... 3.45
Emeryville,Calif. J7 ... 4.20
Fairfield,Ala. T2 ..... 3.45
Fontana,Calif. K1 ..... 4.10
Gary,Ind. C3 ..... 3.45
Houston,Tex. S5 ..... 3.85
Ind.Harbor,Ind. I-2, Y1. 3.45
Johnstown,Pa. B2 ..... 3.45
KansasCity,Mo. S5 .... 4.05
Lackawanna,N.Y. B2 .. 3.45
LosAngeles B3 ..... 4.15
Milton,Pa. B6 ..... 3.45
Minnequa,Colo. C10 ... 4.25
Niles,Calif. P1 ..... 4.17
Pittsburg,Calif. C11 ... 4.15
Pittsburgh J5 ..... 3.45
Portland,Oreg. O4 ..... 4.20
SandSprings,Okla. S5 .. 4.35
Seattle,Wash. B3, N14.. 4.20
So.Chicago,Ill. R2 ..... 3.45
So.Duquesne,Pa. C3..... 3.45
So.SanFrancisco B3 .... 4.20
SparrowsPoint,Md. B2.. 3.45
Struthers,O. Y1 ..... 3.45
Torrance,Calif. C11 .... 4.15
Youngstown C3, R2..... 3.45

BAR SHAPES, Hot-Rolled Alloy
Clairton,Pa. C3 ..... 4.20
Fontana,Calif. K1 ..... 4.95
Gary,Ind. C3 ..... 4.20
Youngstown C3 ..... 4.20

SHEETS, Hot-Rolled Steel (18 gage and heavier)
AlabamaCity,Ala. R2 .. 3.35
Ashland,Ky.(8) A10 ... 3.35
Butler,Pa. A10 ..... 3.35
Cleveland J5, R2 ..... 3.35
Conshohocken,Pa. A3 .. 3.45
Ecorse,Mich.(8) G5 .... 3.55
Fairfield,Ala. T2 ..... 3.35
Fontana,Calif. K1 .... 4.25
Gary,Ind. C3 ..... 3.35
Ind.Harbor,Ind. I-2, Y1. 3.35
Irvin,Pa. C3 ..... 3.35
Lackawanna,N.Y. B2 .. 3.35
Munhall,Pa. C3 ..... 3.35
Niles,O. N12 ..... 3.50
Niles,O. M4 ..... 3.75
Pittsburg,Calif. C11 .... 4.05
Pittsburgh J5 ..... 3.35
Sharon,Pa. S3 ..... 3.35
So.Chicago,Ill. W14 .... 3.35
SparrowsPoint,Md. B2 .. 3.35
Steubenville,O. W10 ... 3.35
Torrance,Calif. C11 .... 4.05
Warren,O. R2 ..... 3.35
Weirton,W.Va. W6 .... 3.35
Youngstown C3, Y1 .... 3.35

SHEETS, Hot-Rolled Carbon Steel (19 gage and lighter)
AlabamaCity,Ala. R2 .. 4.50
Dover,O. R1 ..... 4.65
Ind.Harbor,Ind. I-2 .... 4.40
Mansfield,O. E6 ..... 4.15
Niles,O. N12 ..... 4.10
Niles,O. M4 ..... 4.65
Torrance,Calif. C11 .... 5.15

SHEETS, H-R (14 ga., heavier) High-Strength Low-Alloy
Cleveland J5, R2 ..... 5.05
Conshohocken,Pa. A3 .. 5.05
Ecorse,Mich. G5 ..... 5.25
Fairfield,Ala. T2 ..... 5.05
Fontana,Calif. K1 .... 6.74
Gary,Ind. C3 ..... 5.05
Ind.Harbor,Ind. I-2, Y1. 5.05
Irvin,Pa. C3 ..... 5.05
Lackawanna(35) B2 .... 5.05
Pittsburgh J5 ..... 5.05
Sharon,Pa. S3 ..... 5.05
So.Chicago,Ill. C3 ..... 5.05
SparrowsPoint(36) B2 .. 5.05
Warren,O. R2 ..... 5.05
Weirton,W.Va. W6 .... 5.05
Youngstown, C3, Y1 ... 5.05

SHEETS, Cold-Rolled High-Strength Low-Alloy
Cleveland J5, R2 ..... 6.20
Ecorse,Mich. G5 ..... 6.40
Fontana,Calif. K1 ..... 7.05
Gary,Ind. C3 ..... 6.20
Ind.Harbor,Ind. I-2, Y1. 6.20
Irvin,Pa. C3 ..... 6.20
Lackawanna(37) B2 ... 6.20
Pittsburgh J5 ..... 6.20
Sharon,Pa. S3 ..... 6.20
SparrowsPoint(38) B2 .. 6.20
Warren,O. R2 ..... 6.20
Weirton,W.Va. W6 .... 6.20
Youngstown Y1 ..... 6.20

SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10	4.10
Cleveland J5, R2	4.10
Ecorse,Mich. G5	4.30
Fairfield,Ala. T2	4.10
Follansbee,W.Va. F4	4.10
Fontana,Calif. K1	5.00
Gary,Ind. C3	4.10
GraniteCity,Ill. G4	4.30
Ind.Harbor,Ind. I-2, Y1	4.10
Irvin,Pa. C3	4.10
Lackawanna,N.Y. B2	4.10
Middletown,O. A10	4.10
Pittsburg,Calif. C11	5.05
Pittsburgh J5	4.10
SparrowsPoint,Md. B2	4.10
Steubenville,O. W10	4.10
Warren,O. R2	4.10
Weirton,W.Va. W6	4.10
Youngstown Y1	4.10

SHEETS, Gal'zd No. 10 Steel

AlabamaCity,Ala. R2	4.40
Ashland,Ky.(8) A10	4.40
Canton,O. R2	4.40
Delphos,O. N16	5.15
Dover,O. R1	4.75
Fairfield,Ala. T2	4.40
Gary,Ind. C3	4.40
GraniteCity,Ill. G4	4.60
Ind.Harbor,Ind. I-2	4.40
Irvin,Pa. C3	4.40
Kokomo,Ind. C16	4.50
MartinsFerry,O. W10	4.40
Niles,O. N12	4.65
Pittsburg,Calif. C11	5.15
SparrowsPoint,Md. B2	4.40
Steubenville,O. W10	4.40
Torrance,Calif. C11	5.15
Weirton,W.Va. W6	4.40

SHEETS, Galvanized No. 10, High-Strength Low Alloy

Irvin,Pa. C3	6.75
SparrowsPoint(39) B2	6.75

SHEETS, Gavannealed Steel

Canton,O. R2	4.95
Irvin,Pa. C3	4.95
Kokomo,Ind. C16	5.05
Niles,O. N12	5.20

SHEETS, ZINCGRIP Steel No. 10

Butler,Pa. A10	4.65
Middletown,O. A10	4.65

SHEETS, Electro Galvanized

Cleveland R2 (28)	5.25
Niles,O. R2 (28)	5.25
Weirton,W.Va. W6	5.10

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2	5.05

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBottom,W.Va. W10	4.80
Gary,Ind. C3	4.80
Mansfield,O. E6	4.80
Middletown,O. A10	4.80
Niles,O. N12	4.80
Weirton,W.Va. W6	4.80

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	5.20

ROOFING SHORT TERNES (Package; 8 lb coated)

Gary,Ind. C3	$17.50
Yorkville, O. W10	17.50

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2	$6.60
Gary,Ind. C3	6.50
Ind.Harbor I-2	6.50
Irvin,Pa. C3	6.50
Yorkville,O. W10	6.50

SHEETS, Lt. Coated Ternes, 6 lb

Yorkville,O. W10	$7.20

SHEETS, Mfg. Ternes, 8 lb

Gary,Ind. C3	$8.10
Warren,O. R2	8.10
Yorkville,O. W-10	8.10

SHEETS, Coated Ternes, 12 lb

Yorkville,O. W10	8.95

SHEETS, Culvert, No. 16 Corrugated Ingot Iron

	Cu Alloy	Cu Fe
Ashland A10	5.20	...
Canton,O. R2	5.25	5.70
Fairfield,Ala. T2	5.20	5.45
Gary C3	5.20	5.45
IndianaHarbor I-2	5.20	5.45
Irvin,Pa. C3	5.20	5.45
Kokomo C16	5.40	...
MartinsFy,O. W10	5.20	5.45
Pittsburg,Cal. C11	5.95	...
SparrowsPt. B2	5.20	...
Torrance,Cal. C11	5.95	...

SHEETS, Culvert, No. 16 Corrugated Ingot Iron

Ashland,Ky. A10	5.45

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland,Ky.(8) A10	3.60
Cleveland R2	3.95
Ind.Harbor,Ind. I-2	3.60
Warren,O. R2	3.95

SHEETS, Cold-Rolled Ingot Iron

Cleveland R-2	4.70
Middletown,O. A10	4.60
Warren,O. R2	4.70

SHEETS, Galvanized Ingot Iron No. 10 Flat

Ashland,Ky.(8) A10	4.65
Canton,O. R2	5.15
Ind.Harbor,Ind. I-2	4.80

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10	4.90
Middletown,O. A10	4.90

SHEETS,Well Casing

Torrance,Calif. C11	4.85

SHEETS, Drum Body

Pittsburg,Calif. C11	4.05
Torrance,Calif. C11	4.05

SHEETS, Aluminized

Butler,Pa. A10	7.75

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$6.35	$6.60	$6.85
Fairfield,Ala. T2	6.45	6.70	6.95
Gary,Ind. C3	6.35	6.60	6.85
GraniteCity,Ill. G4	6.55	6.80	7.05
Ind.Harbor,Ind. I-2, Y1	6.35	6.60	6.85
Irvin,Pa. C3	6.35	6.60	6.85
Niles,O. R2	6.35	6.60	6.85
Pittsburg,Calif. C11	7.10	7.35	7.60
SparrowsPoint,Md. B2	6.45	6.70	6.95
Weirton,W.Va. W6	6.35	6.60	6.85
Yorkville,O. W10	6.35	6.60	6.85

SHEETS, SILICON, H.R. or C.R. (22 Ga.) Coils (Cut Lengths ½c lower)

	Field	Armature	Electric	Motor	Dynamo
BeechBottom W10 (cut lengths)	...	...	6.70	7.95	8.75
Brackenridge,Pa. A4	...	...	7.20	8.45	9.25
Follansbee F4 (cut length)	...	...	6.95	7.95	8.75
GraniteCity,Ill. G4	...	...	*7.40*	*8.65*	...
Ind.Harbor,Ind. I-2	6.40	6.70	(34)	...	...
Mansfield,O. E6 (cut lengths)	5.90	6.20	6.70	7.95	8.75
Niles,O. N12 (cut lengths)	...	...	6.20	6.70	...
Niles,O. M4 (24 Gage)	5.65	5.95	6.45	...	...
Vandergrift,Pa. C3	...	6.70	7.20	8.45	9.25
Warren,O. R2	6.40	6.70	7.20	8.45	9.25
Zanesville,O. A10	...	6.70	7.20	8.45	9.25

SHEETS, SILICON (22 Gage Base) Coils (Cut Lengths ½c lower)

Transformer Grade	72	65	58	52
BeechBottom W10 (cut lengths)	9.30	9.85	10.55	11.35
Brackenridge,Pa. A4	9.80	10.35	11.05	...
Follansbee F4 (cut length)	9.30	9.85	10.55	11.35
Vandergrift,Pa. C3	9.80	10.35	11.05	11.85
Warren,O. R2	9.80	...	...	...
Zanesville,O. A10	9.80	10.35	11.05	11.85

H.R. or C.R. COILS AND CUT LENGTHS, SILICON (22 Ga.)

	T-100	T-90	T-80
Vandergrift,Pa. C3	12.35	13.20	14.20

TIN PLATE, American Coke (Base Box)

	1.25 lb	1.50 lb
Aliquippa J5	$7.30	$7.50
Fairfield,Ala. T2	7.40	7.60
Gary C3	7.30	7.50
Gran.City,Ill. G4	7.50	7.70
Ind.Harbor I-1, Y1	7.30	7.50
Irvin,Pa. C3	7.30	7.50
Pitts.Cal. C11	8.05	8.25
Sp.Pt.,Md. B2	7.40	7.60
Warren R2	7.30	7.50
Weirton W6	7.30	7.50
Yorkville,O. W10	7.30	7.50

CANMAKING BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$5.60
Fairfield,Ala. T2	5.70
Gary,Ind. C3	5.60
GraniteCity,Ill. G4	5.80
Ind.Harbor,Ind. I-2, Y1	5.60
Irvin,Pa. C3	5.60
Niles,O. R2	5.60
Pittsburg,Calif. C11	6.35
SparrowsPoint,Md. B2	5.70
Warren,O. R2	5.60
Weirton,W.Va. W6	5.60
Yorkville,O. W10	5.60

HOLLOWARE ENAMELING Black Plate (29 gage)

Aliquippa,Pa. J5	5.30
Follansbee,W.Va. F4	5.30
Gary,Ind. C3	5.30
GraniteCity,Ill. G4	5.50
Ind.Harbor,Ind. Y1	5.30
Irvin,Pa. C3	5.30
Niles,O. R2	5.30
SparrowsPoint,Md. B2	5.40
Warren,O. R2	5.30
Yorkville,O. W10	5.30

SHEETS, Enam'lg. Iron

Ashland,Ky.(8) A10	4.40
Cleveland R2	4.40
Ecorse,Mich. G5	4.70
Gary,Ind. C3	4.40
GraniteCity,Ill. G4	4.60
Ind.Harbor,Ind. I-2	4.40
Irvin,Pa. C3	4.40
Middletown,O. A10	4.40
Niles,O. M4	4.90
Youngstown Y1	4.40

STRIP, Hot-Rolled, High-Strength Low-Alloy

Bessemer,Ala. T2	4.95
Conshohocken,Pa. A3	4.95
Ecorse,Mich. G5	5.15
Fairfield,Ala. T2	4.95
Fontana,Cal. K1	6.64
Gary,Ind. C3	4.95
Ind.Harb.,Ind. I-2, Y1	4.95
Lackawanna,N.Y. B2	4.95
Sharon,Pa. S3	4.95
SparrowsPoint,Md. B2	4.95
Warren,O. R2	4.95
Weirton,W.Va. W6	4.95
Youngstown C3, Y1	4.95

STRIP, Hot-Rolled Alloy

Bridgeprt,Conn.(10) S15	5.10
Carnegie,Pa. S18	5.10
Fontana,Calif. K1	6.30
Gary,Ind. C3	5.10
Houston,Tex. S5	5.50
KansasCity,Mo. S5	5.70
NewBritn,Conn.(10) S15	5.10
Sharon,Pa. S3	5.10
Youngstown C3	5.10

STRIP,Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	3.50
Warren,O. R2	3.85

STRIP, Hot-Rolled Carbon

Alton,Ill.(1) L1	3.25
Ashland,Ky.(8) A10	3.25
Atlanta A11	3.40
Bessemer,Ala. T2	3.25
Bridgeprt,Conn.(10) S15	3.25
Butler,Pa. A10	3.25
Carnegie,Pa. S18	3.25
Conshohocken,Pa. A3	3.35
Detroit M1	3.45
Ecorse,Mich. G5	3.45
Fairfield,Ala. T2	3.25
Fontana,Calif. K1	4.40
Gary,Ind. C3	3.25
Houston,Tex. S5	3.65
Ind.Harbor,Ind. I-2, Y1	3.25
KansasCity,Mo.(9) S5	3.85
Lackawanna,N.Y. B2	3.25
LosAngeles B3	4.00
Milton,Pa. B6	3.25
Minnequa,Colo. C10	4.30
NewBritain(10) S15	3.25
N.Tonawanda,N.Y. B11	3.25
Pittsburg,Calif. C11	4.00
Riverdale,Ill. A1	3.25
SanFrancisco S7	3.90
Seattle B3, N14	4.25
Sharon,Pa. S3	3.25
So.Chicago,Ill. W14	3.25
So.SanFrancisco B3	4.00
SparrowsPoint,Md. B2	3.25
Torrance,Calif. C11	4.00
Warren,O. R2	3.25
Weirton,W.Va. W6	3.25
WestLeechburg,Pa. A4	3.25
Youngstown C3, Y1	3.25

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10) S15	9.50
Carnegie,Pa. S18	9.50
Cleveland A7	9.50
Dover,O. G6	9.50
Harrison,N.J. C18	9.80
NewBritn,Conn.(10) S15	9.50
Pawtucket,R.I.(11) N8	9.50
Pawtucket,R.I.(12) N8	9.80
Sharon,Pa. S3	9.50
Worcester,Mass. A7	9.80
Youngstown C8	9.50

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	4.75

STRIP, Cold-Finished, Spring Steel (Annealed)

	0.25-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Bridgeport,Conn.(10) S15	4.15	5.95	6.55	8.50	10.80
Bristol,Conn. W1	...	...	6.40	8.35	...
Carnegie,Pa. S18	...	5.95	6.55	8.50	10.80
Cleveland A7	4.15	5.95	6.55	8.50	10.80
Dover,O. G6	4.15	5.95	6.55	8.50	10.80
FranklinPark,Ill. T6	4.40	6.10	6.70	8.65	...
Harrison,N.J. C18	...	...	6.85	8.80	11.10
Mattapan,Mass. T6	4.65	6.25	6.85	8.80	11.10
NewBritn.,Conn.(10) S15	4.15	5.95	6.55	8.50	10.80
NewCastle,Pa. B4	4.15	5.95	6.55	8.50	...
NewCastle,Pa. E5	4.15	5.95	6.55	8.50	10.80
NewYork W3	...	6.30	6.90	8.85	11.15
Pawtucket,R. I. N8:					
Cleve.orPitts.Base (29)	4.55	5.50	6.10	8.05	10.35
Worcester,Base (29)	4.50	5.80	6.40	8.35	10.65
Sharon,Pa. S3	4.15	5.95	6.55	8.50	10.80
Trenton,N.J. R5	...	6.25	6.85	8.80	11.10
Wallingford,Conn. W2	4.65	6.25	6.85	8.80	11.10
Weirton,W.Va. W6	4.15	5.95	6.55	8.50	10.80
Worcester,Mass. A7	4.45	6.25	6.85	8.80	11.10
Worcester,Mass. T6	4.65	6.25	6.85	8.80	11.10
Youngstown C8	*4.50*	*5.95*	*6.55*	*8.50*	*10.80*

Spring Steel (Tempered)

Trenton,N.J. R5	...	...	9.30	11.25	13.95

STRIP, Cold-Rolled Carbon

Anderson,Ind.(40) G6	4.15
Berea,O. C7	6.60
Bridgeprt,Conn.(10) S15	4.15
Butler,Pa. A10	4.15
Cleveland A7, J5	4.15
Dearborn,Mich. D3	4.40
Detroit, D2	4.40
Detroit M1	4.35
Dover,O.(40) G6	4.15
Ecorse,Mich. G5	4.35
Follansbee,W.Va. F4	4.15
Fontana,Calif. K1	5.40
FranklinPark,Ill. T6	4.30
Ind.Harbor,Ind. I-2	4.30
Lackawanna,N.Y. B2	4.15
LosAngeles C1	5.50
Mattapan,Mass.(21) T6	4.65
Middletown,O. A10	4.15
NewBritain(10) S15	4.15
NewCastle,Pa. B4, E5	4.15
NewHaven,Conn. A7, D2	4.65
NewYork W3	5.00
Pawtucket,R.I.(11) N8	4.70
Pawtucket,R.I.(21) N8	4.65
Riverdale,Ill. A1	4.30
Sharon,Pa.(30) S3	4.15
SparrowsPoint,Md. B2	4.15
Trenton,N.J. (13) R5	4.65
Wallingford,Conn. W2	4.65
Warren,O.(25) T5	4.15
Warren,O. R2	4.15
Weirton,W.Va. W6	4.15
Youngstown C8, Y1	4.15

STRIP, Cold-Rolled, High-Strength Low-Alloy

Cleveland A7, J5	6.20
Dover,O. G6	6.20
Ecorse,Mich. G5	6.40
Fontana,Calif. K1	6.95
Lackawanna,N.Y., B2	6.40
Sharon,Pa. S3	6.20
SparrowsPoint,Md. B2	6.40
Warren,O. R2	6.20
Weirton,W.Va. W6	6.20
Youngstown Y1	6.20

STRIP, Electro Galvanized

Weirton,W.Va. W6	4.15
Youngstown C8	4.15

Key to Producing Companies

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A7 American Steel&Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.

B1 Babcock & Wilcox Tube
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Boiardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B14 A. M. Byers Co.

C1 Calif. Cold Rolled Steel
C3 Carnegie-Illinois Steel
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Clev. Cld.Roll.MillsCo.
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia Steel Co.
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Son, Henry
D6 Driver-Harris Co
D7 Dickson Weatherproof Nail Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F6 Fretz-Moon Tube Co.

G1 Geneva Steel Co.
G2 Globe Iron Co.
G3 Globe Steel Tubes Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H4 Heppenstall Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K5 Kidd Drawn Steel Co.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Steel
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

UNIVERSITY OF MICHIGAN LIBRARIES

TIGHT COOPERAGE HOOP

Atlanta A11	3.60
Riverdale,Ill. A1	3.60
Sharon,Pa. S3	3.60
Youngstown C3	3.60

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	5.90
Alton,Ill.(1) L1	5.90
Bartonville,Ill.(1) K4	5.90
Buffalo W12	5.90
Cleveland A7	5.90
Donora,Pa. A7	5.90
Duluth A7	5.90
Fostoria,O. S1	5.90
Johnstown,Pa. B2	5.90
LosAngeles B3	6.85
Milbury,Mass(12) N6	6.20
Monessen,Pa. P7	5.90
Palmer,Mass. W12	6.20
Pittsburg,Calif. C11	6.85
Portsmouth,O. P12	5.90
Roebling,N.J. R5	6.20
So.Chicago,Ill. R2	5.90
SparrowsPoint,Md. B2	6.00
Struthers,O. Y1	5.90
Trenton,N.J., A7	6.20
Waukegan,Ill. A7	5.90
Worcester A7,J4,T6,W12	6.20

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	5.35
Buffalo W12	5.35
Cleveland A7	5.35
Crawfordsville,Ind. M8	*5.35*
Dover,O. G6	5.35
Fostoria,O. S1	5.50
Kokomo,Ind. C16	5.35
FranklinPark,Ill. T6	5.70
Massillon,O. R8	5.35
Monessen,Pa. P7	5.35
Pawtucket,R.I.(11) N8	5.70
Pawtucket,R.I.(12) N8	5.65
Trenton,N.J. R5	5.65
Worcester A7, T6, W12	5.65

WIRE, Fine and Weaving (8-in. Coils)

Bartonville,Ill.(1) K4	8.45
Buffalo W12	8.45
Chicago W13	8.45
Cleveland A7	8.45
Crawfordsville,Ind. M8	*8.45*
Fostoria,O. S1	8.45
Johnstown,Pa. B2	7.70
Kokomo,Ind. C16	8.45
Palmer,Mass. W12	8.75
Portsmouth,O. P12	8.45
Roebling,N.J. R5	8.75
Waukegan,Ill. A7	8.45
Worcester,Mass. A7, T6	8.75

WIRE, Manufacturers Bright, Low-Carbon

AlabamaCity,Ala. R2	4.50
Aliquippa,Pa. J5	4.50
Atlanta A11	4.60
Alton,Ill.(1) L1	4.50
Bartonville,Ill.(1) K4	4.50
Buffalo W12	4.50
Chicago W13	4.50
Cleveland A7, C20	4.50
Crawfordsville,Ind. M8	*4.60*
Donora,Pa. A7	4.50
Duluth A7	4.50
Fairfield,Ala. T2	4.50
Fostoria,O.(24) S1	4.85
Houston S5	4.90
Johnstown,Pa. B2	4.50
Joliet,Ill. A7	4.50
KansasCity,Mo. S5	5.10
Kokomo,Ind. C16	4.60
LosAngeles B3	5.45
Minnequa,Colo. C10	4.75
Monessen,Pa. P7	4.50
Newark,6-8ga. I-1	5.15
No.Tonawanda B11	4.90
Palmer,Mass. W12	4.80
Pittsburg,Calif. C11	5.45
Portsmouth,O. P12	4.50
Rankin,Pa. A7	4.50
So.Chicago,Ill. R2	4.50
So.SanFrancisco C10	5.45
SparrowsPoint,Md. B2	4.60
Sterling,Ill.(1) N15	4.50
Struthers,O. Y1	4.50
Torrance,Calif. C11	5.45
Waukegan,Ill. A7	4.50
Worcester,Mass. A7, T6	4.80

WIRE, Upholstery Spring

Aliquippa,Pa. J5	5.55
Alton,Ill.(1) L1	5.55
Buffalo W12	5.55
Cleveland A7	5.55
Donora,Pa. A7	5.55
Duluth A7	5.55
Johnstown,Pa. B2	5.55
LosAngeles B3	6.50
Monessen P7	5.55
NewHaven,Conn. A7	5.85
Palmer,Mass. W12	5.85
Pittsburg,Calif. C11	6.50
Portsmouth,O. P12	5.55
Roebling,N.J. R5	5.85
So.Chicago,Ill. R2	5.55
SparrowsPoint,Md. B2	5.65
Struthers,O. Y1	5.55
Torrance,Calif. C11	6.50
Trenton,N.J. A7	5.85
Waukegan,Ill. A7	5.55
Worcester,Mass. A7	5.85

ROPE WIRE

	Mild Plow	Plow	Imp. Plow
Bartonville,Ill. K4	8.05	8.05	8.30
Buffalo W12	8.05	8.05	8.30
Cleveland A7	8.05	8.05	8.30
Donora,Pa. A7	8.05	8.05	8.30
Fostoria,O. S1	8.05	8.05	8.30
Johnstown,Pa. B2	7.50	7.80	8.20
Monessen,Pa. P7	8.05	8.05	8.30
NewHaven,Conn. A7	8.35	8.35	8.60
Palmer,Mass. W12	8.05	8.05	8.30
Portsmouth,O. P12	8.05	8.05	8.30
Roebling,N.J. R5	8.35	8.35	8.60
SparrowsPoint,Md. B2	7.60	7.90	8.30
Struthers,O. Y1	8.05	8.05	8.30
Trenton,N.J. A7	8.35	8.35	8.60
Waukegan,Ill. A7	8.05	8.05	8.30
Williamsport,Pa. B2	7.60	7.90	8.30
Worcester,Mass. J4, T6	8.35	8.35	8.60

WIRE, Merchant Quality (6 to 8 gage)

	An'ld	Galv.
AlabamaCity R2	5.35	5.60
Aliquippa J5	5.35	5.60
Atlanta A11	5.45	5.70
Bartonville(19) K4	5.35	5.60
Buffalo(31) W12	4.50	...
Cleveland A7	5.35	5.60
Crawfrdsvil. M8	*5.45*	*5.70*
Donora A7	5.35	5.60
Duluth A7	5.35	5.60
Fairfield T2	5.35	5.60
Houston,Tex. S5	5.75	6.00
Johnstown B2	5.35	5.60
Joliet,Ill. A7	5.35	5.60
KansasCy,Mo. S5	5.95	6.20
Kokomo C16	5.45	5.70
LosAngeles B3	6.30	...
Minnequa C10	5.60	5.85
Monessen P7	5.35	5.60
Palmer(31) W12	4.80	...
Pitts.,Cal. C11	6.30	6.55
Prtsmth.(18) P12	5.35	5.60
Rankin A7	5.35	5.60
So.Chicago R2	5.35	5.60
So.S.Fran. C10	6.30	6.55
SparrowsPt. B2	5.45	5.70
Sterling,Ill.(1)N15	5.35	5.60
Struthers,O. Y1	5.35	5.60
Torrance,Cal. C11	6.30	...
Worcester A7	5.65	5.90

WIRE (16 gage)

	An'ld Stone	Galv. Stone
Aliquippa J5	9.80	11.30
Bartonville(1) K4	9.80	11.30
Cleveland A7	9.80	11.30
Crawfrdsvil. M8	*9.80*	*11.30*
Fostoria,O. S1	9.90	11.40
Johnstown B2	9.80	11.30
Kokomo C16	9.80	11.30
Minnequa C10	9.40	10.90
Palmer,Mass. W12	9.35	10.85
Pitts.,Cal. C11	10.15	11.65
Prtsmth.(18) P12	9.80	11.30
SparrowsPt. B2	9.90	11.40
Waukegan A7	9.80	11.30

WIRE, Galv'd ACSR for Cores

Roebling,N.J. R5	8.45

WIRE, Tire Bead

Roebling,N.J. R5	10.80

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	126
Aliquippa,Pa. J5	126
Atlanta A11	128
Crawfordsville M8	*128*
Crawfordsville M8	129
Donora,Pa. A7	126
Duluth,Minn. A7	126
Fairfield,Ala. T2	126
Houston,Tex. S5	134
Johnstown,Pa. B2	126
Joliet,Ill. A7	126
KansasCity,Mo. S5	138
Kokomo,Ind. C16	128
Minnequa,Colo. C10	131
Monessen,Pa. P7	126
Pittsburg,Calif. C11	146
Portsmouth,O.(18) P12	126
Rankin,Pa. A7	126
So.Chicago,Ill. R2	126
So.San.Fran.,Calif. C10	146
SparrowsPoint,Md. B2	128
Sterling,Ill.(1) N15	126

FENCE POSTS

	Col.
Duluth A7	116
Huntington,W.Va. W7	116
Johnstown,Pa. B2	112
Joliet,Ill. A7	116
Minnequa,Colo. C10	121
Moline,Ill. R2	112
So.Chicago R2	116
Williamsport,Pa. S19	120

WOVEN FENCE,9-15½Ga. Col.

AlabamaCity,Ala. R2	116
Ala.City,Ala.,17-18ga.R2	198
Aliquip.,Pa.9-14½ga. J5	116
Atlanta A11	118
Bartonville,Ill.(19) K4	116
Crawfordsville,Ind. M8	*118*
Donora,Pa. A7	116
Duluth A7	116
Houston,Tex. S5	124
Fairfield,Ala. T2	116
Johnstown,Pa. B2	116
Johnstn,17ga.,6" B2	190
Johnstn,17ga.,4" B2	193
Joliet,Ill. A7	116
KansasCity,Mo. S5	128
Kokomo,Ind. C16	118
Minnequa,Colo. C10	121
Monessen,Pa. P7	116
Pittsburg,Calif. C11	139
Portsmouth,O.(18) P12	116
Rankin,Pa. A7	116
So.Chicago,Ill. R2	116
Sterling,Ill.(1) N15	116

BALE TIES, Single Loop Col.

AlabamaCity,Ala. R2	113
Atlanta A11	114
Bartonville,Ill.(19) K4	113
Chicago W13	113
Crawfordsville M8	*115*
Donora,Pa. A7	113
Duluth A7	113
Fairfield,Ala. T2	113
Joliet,Ill. A7	113
KansasCity,Mo. S5	125
Kokomo,Ind. C16	115
Minnequa,Colo. C10	118
Pittsburg,Calif. C11	137
Portsmouth,O.(18) P12	113
So.Chicago,Ill. R2	113
So.SanFran.,Calif. C10	137
SparrowsPoint,Md. B2	115
Sterling,Ill.(1) N15	113

NAILS & STAPLES, Stock To Dealers & Mfrs. (7) Col.

AlabamaCity,Ala. R2	106
Aliquippa,Pa. J5	106
Atlanta A11	108
Bartonville,Ill.(19) K4	106
Chicago,Ill. W13	106
Cleveland A9	112
Crawfordsville,Ind. M8	*108*
Donora,Pa. A7	106
Duluth A7	106
Fairfield,Ala. T2	106
Galveston,Tex. D7	114
Houston,Tex. S5	114
Johnstown,Pa. B2	106
Joliet,Ill. A7	106
KansasCity,Mo. S5	118
Kokomo,Ind. C16	108
Minnequa,Colo. C10	111
Monessen,Pa. P7	106
Pittsburg,Calif. C11	125
Portsmouth,O. P12	106
Rankin,Pa. A7	106
So.Chicago,Ill. R2	106
SparrowsPoint,Md. B2	108

RAILS

	Std. No. 1	Std. No. 2	Std. All No. 2	TeeRails 60 lb Under
Bessemer,Pa. C3	3.40	3.30	3.35	3.75
Ensley,Ala. T2	3.40	3.30	...	3.75
Fairfield,Ala. T2	...	...	...	3.75
Gary,Ind. C3	3.40	3.30	3.35	...
Huntington,W.Va. W7	...	...	...	3.75
Ind.Harbor,Ind. I-2	3.40	3.30	3.35	...
Johnstown,Pa. B2	...	...	...(16)	3.75
Lackawanna B2	3.40	3.30	...	3.75
Minnequa,Colo. C10	3.40	3.30	...	4.25
Steelton,Pa. B2	3.40	3.30	...	...

NAILS & STAPLES, Non-Stock

AlabamaCity,Ala. R2	5.35
Bartonville,Ill.(19) K4	5.35
Crawfordsville,Ind. M8	*5.45*
Donora,Pa. A7	5.35
Duluth A7	5.35
Johnstown,Pa. B2	5.35
Joliet,Ill. A7	5.35
Kokomo,Ind. C16	5.45
Minnequa,Colo. C10	5.60
Pittsburg,Calif. C11	6.30
Portsmouth,O. P12	5.35
Rankin,Pa. A7	5.35
So.Chicago,Ill. R2	5.35
SparrowsPoint,Md. B2	5.45
Worcester,Mass. A7	5.65

NAILS, Cut (100 lb keg) To dealers (33)

Conshohocken,Pa. A3	$6.75
Wheeling,W.Va. W10	6.75

AXLES

Fairfield,Ala. T2	5.25
Gary,Ind. C3	5.25
Ind.Harbor,Ind. S13	5.25
Johnstown,Pa. B2	5.25
McKeesRocks,Pa. C3	5.25

TIE PLATES

Fairfield,Ala. T2	4.20
Gary,Ind. C3	4.20
Ind.Harbor,Ind. I-2	4.20
Lackawanna,N.Y. B2	4.20
Minnequa,Colo. C10	4.20
Pittsburg,Calif. C11	4.35
Pittsburgh R2	4.20
Seattle B3	4.35
Steelton,Pa. B2	4.20
Torrance,Calif. C11	4.35
Weirton,W.Va. W6	4.20

JOINT BARS

Bessemer,Pa. C3	4.40
Fairfield,Ala. T2	4.40
Ind.Harbor,Ind. I-2	4.40
Joliet,Ill. C3	4.40
Lackawanna,N.Y. B2	4.40
Minnequa,Colo. C10	4.40
Steelton,Pa. B2	4.40

TRACK BOLTS (20) Treated

Fairfield,Ala. T2	9.10
KansasCity,Mo. S5	9.10
Lebanon,Pa.(32) B2	8.85
Minnequa,Colo. C10	8.60
Pittsburgh O3, P14	9.10
Seattle B3	9.35

STANDARD TRACK SPIKES

Fairfield,Ala. T2	5.60
Ind.Harbor,Ind. I-2, Y1	5.60
KansasCity,Mo. S5	5.85
Lebanon,Pa. B2	5.60
Minnequa,Colo. C10	5.60
Pittsburgh J5	5.60
Seattle B3	6.10
So.Chicago,Ill. R2	5.60
Struthers,O. Y1	5.60
Youngstown R2	5.60

TOOL STEEL

Grade	Cents per lb	Grade	Cents per lb
Reg. Carbon	21.00	18W,4Cr,3V	126.00
Extra Carbon	24.50	18W,4Cr,2V,9Co	185.50
Spec. Carbon	29.50	18W,4Cr,2V,6Co	169.50
Oil Hardening	32.00	18.25W,4.25Cr,1V,4.75Co	156.50
Cr Hot Wrk.	32.00	20.25W,4.25Cr,1.6V,12.25Co	293.50
Hi-Carbon-Cr	57.50	1.5W,4Cr,1V,8.5Mo	71.50
18W,4Cr,1V	100.00	6.4W,4.5Cr,1.9V,5Mo.	76.50
18W,4Cr,2V	113.00	6W,4Cr,3V,6Mo	97.00

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, H4, J3, L3, M9, M14, R2, S8, T7, U4, V2, V3.

Key to Producing Companies

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M9 Midvale Co.
M10 Missouri-Illinois Furnace
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M14 McInnes Steel Co.
N2 National Supply Co.
N3 National Tube Co.
N5 Nelsen Steel & Wire Co.
N6 New EngHighCarb. Wire
N8 Newman-Crosby Steel
N12 Niles Rolling Mill Co.
N14 Nrthwst. Steel Roll.Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg.Co.
O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills.
P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P9 Pittsburgh Tube Co.
P11 Pollak Steel Co.
P12 Portsmouth Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R7 Rotary Electric Steel Co.
R8 Reliance Div.,EatonMfg.
S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sloss-Sheffield S.&I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
T2 Tenn. Coal, Iron & R.R.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
U4 Universal Cyclops Steel
V2 Vanadium Alloys Steel
V3 Vulcan Crucible Steel Co.
W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 Wstrn.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W16 Worth Steel Co.
W18 Wyckoff Steel Co.
Y1 Youngstwn Sheet & Tube

(1) Chicago Base. (2) Angles.
(3) Merchant. (4) Reinforcing.
(5) Philadelphia del.
(6) Chicago or Birm. Base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh Base.
(11) Cleveland & Pittsburgh Base.
(12) Worcester, Mass. Base.
(13) 3"& wider; over ½" to under 3" 5.15c.
(14) Also wide flange beams.
(15) ⅛" and thinner.
(16) 40 lb and under.
(17) Flats only.
(18) To dealers.
(19) Chicago & Pittsburgh Base.
(20) Deduct 0.25c for untreated.
(21) New Haven, Conn. Base.
(22) Del. San Fran. Bay area.
(23) Angles 1"x1" to 1¼"x1¼" only
(24) Deduct 0.35c for finer than 15 Ga.
(25) Up to 0.035 C; 4.40c, 0.035 C and over.
(26) Reinforcing, mill shipments; to consumers, 4.83c; fabricated to fabricators, 4.53c.
(28) Bonderized.
(29) 0.26-0.40 C.
(30) 0.40 C and less.
(31) Not annealed.
(32) Untreated.
(33) To jobbers, deduct 20 cents.
(34) 6.70c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 15 Ga. & lighter; 60" & narrower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 4.40c, 0.035" and heavier.

STANDARD PIPE, T. & C.

BUTTWELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Black A	Black B	Black C	Galvanized D	Galvanized E	Galvanized F
⅛	5.5c	0.24	36.5	34.5	35.5	8.5	9	7.5
¼	6.0	0.42	33.5	31.5	32.5	9.5	11	8.5
⅜	6.0	0.57	29	27	28	5.5	8	4.5
½	8.5	0.85	40.5	38.5	39.5	24.0	22.0	23.0
¾	11.5	1.13	43.5	41.5	42.5	28.0	26.0	27.0
1	17.0	1.68	46.0	44.0	45.0	31.0	29.0	30.0
1¼	23.0	2.28	46.5	44.5	45.5	31.5	29.5	30.5
1½	27.5	2.73	47.0	45.0	46.0	32.0	30	31.0
2	37.0	3.68	47.5	45.5	46.5	32.5	30.5	31.5
2½	58.5	5.82	48.0	46.0	47.0	33.0	31.0	32.0
3	76.5	7.62	48.0	46.0	47.0	33.0	31.0	32.0

Column A: Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa. ⅛-⅜", F6; Benwood, W. Va., 1⅛ percentage points lower on ⅛", 2 points lower on ¼", 3 points lower on ⅜", W10. Wheatland, Pa., 2 pts lower on ⅛" through ⅜",W9. Following make ½" and larger: Lorain, O. N3; Youngstown, plus 42% on 3½" and 4", R2; Youngstown Y1; Aliquippa, Pa. J5. Fontana, Calif. K1 quotes 11 points lower on ½" and larger continuous weld and 31% on 3½" and 4".

Columns B & E: Sparrows Point Md. B2.

Columns C & F: Indiana Harbor, Ind., ½" through 3", Y-1; Alton, Ill. (Lorain, O., base) L1.

Column D: Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa., ⅛" through ⅜", F6; Benwood, W. Va., except 3½ points lower on ⅛", 2½ pts on ¼", 3 pts on ⅜" W10. Wheatland, Pa., except 2 pts lower on ⅛" through ⅜", W9. Following make ½" and larger: Lorain N3; Youngstown, plus 26.5% on 3½" and 4", R2; Youngstown, Y1; Aliquippa, Pa. J5. Fontana, Calif. K1 quotes 11 points lower on ½" and larger continuous weld and 15.5% on 3½" and 4".

SEAMLESS AND ELECTRIC WELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	Seamless Galv. B	Elec. Weld Black C	Elec. Weld Galv. D
2	37.0c	3.68	36.0	20.5	36.0	20.5
2½	58.5	5.82	39.0	23.5	39.0	23.5
3	76.5	7.62	39.0	23.5	39.0	23.5
3½	92.0	9.20	41.0	25.5	41.0	25.5
4	$1.09	10.89	41.0	25.5	41.0	25.5
5	1.48	14.81	41.0	25.5	41.0	25.5
6	1.92	19.18	41.0	25.5	41.0	25.5

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5; Lorain, O. N3; Youngstown Y1.

Columns C & D: Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft. inclusive.

O.D. In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
1	13	12.36	14.39	13.96	13.96
1¼	13	14.63	17.05	14.19	16.54
1½	13	16.17	19.02	15.68	18.45
1⅝	13	18.39	21.64	17.84	20.99
2	13	20.61	24.24	19.99	23.51
2¼	13	22.96	27.03	22.27	26.22
2½	12	25.29	29.76	24.53	28.87
2½	12	27.71	32.58	26.88	31.60
2¾	12	29.36	34.53	28.48	33.49
3	12	30.82	36.27	29.90	35.18
3¼	11	35.87	42.22	34.79	40.95
3½	11	38.52	45.35	37.36	43.99
4	10	47.82	56.25	46.39	54.56
4½	9	63.37	74.59	61.47	72.35
5	9	73.37	86.32	71.17	83.73
6	7	112.62	132.51	....	....

Boiler tube producers include Babcock & Wilcox Tube Co., National Tube Co., Globe Steel Tubes Co., Pittsburgh Steel Co., Republic Steel Corp., Standard Tube Co.

CLAD STEELS

(Cents per pound)

Cladding Stainless	Plates Carbon Base 10%	Plates Carbon Base 20%	Strip Cold-Rolled Carbon Base 10%	Strip Cold-Rolled Carbon Base Both sides	Sheets Carbon Base 10%	Sheets Carbon Base 20%	Sheets Copper Base Both Sides
302	....	....	....	....	19.75	21.50–22.50	75.00
304	22.50	26.50	....	....	20.75	22.50–24.00	77.00
305	....	....	....	....	....	....	79.00
309	27.00	31.00	....	....	....	....	....
310	32.50	36.50	....	....	....	....	105.00
316	27.00	31.00	....	....	26.00	28.00–32.00	....
317	30.50	34.50	....	....	....	....	....
318	29.50	33.50	....	....	....	....	....
321	23.50	27.50	....	....	23.00	25.00	90.00
347	25.00	29.00	....	....	24.00	26.00–30.00	94.00
405	18.75	24.75	....	....	....	....	....
410	18.25	24.25	....	....	....	....	....
430	18.25	24.25	....	....	....	....	....
Nickel	27.50	34.50	31.50	41.00	....	....	88.00
Inconel	36.00	46.00	....	....	....	....	115.00
Monel	29.00	37.00	26.50	33.50	....	....	83.00
Copper*	....	....	19.75†	23.75†	....	....	....

* Dexodized. † Deduct 4.25c for hot-rolled. Production points for carbon base products: Stainless plates and sheets, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. W16 and Coatesville, Pa. L7; nickel, inconel and monel-clad plates, Coatesville L7; nickel, monel and copper-clad strip, Carnegie, Pa. S18. Production point for copper-base sheets is Carnegie A13.

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(F.o.b. midwestern plants; per cent off list for less than case lots to consumers)

6 in. and shorter:
- ½-in. & smaller diam. 27
- ⅝-in. & ⅞-in. 29
- 1-in. and larger 26

Longer than 6 in.:
- All diams. 22

Lag bolts, all diams.:
- 6 in. and shorter.... 30
- over 6 in. long..... 28

Ribbed Necked Carriage. 26
Blank 40
Plow 40
Step, Elevator, Tap, and Sleigh Shoe 28
Tire bolts 20
Boiler & Fitting-Up Bolts 37

NUTS

H.P. & C.P. Reg. & Heavy Square:	Reg.	Heavy
½-in. and smaller ...	25	
⅝-in. & ⅞-in.	23	
1-in.-1½-in.	23	
1⅝ in. and larger....	16	
H.P. Hex.:	Reg.	Heavy
½-in. & smaller	33	29
⅝-in. & ⅞-in..	28	25
1-in.-1½-in. ..	25	23
1⅝ in. & larger	17	16
C.P. Hex:		
½-in. & smaller	33	29
⅝-in. & ⅞-in..	30	27
1-in. & 1½ in.	27	24
1⅝ in. & larger	20	17

SEMIFINISHED NUTS

American Standard

(Per cent off list for less than case or keg quantities)

½-in. and smaller	Hvy.	Reg.	Lght.
	35	41	41
⅝-in. & ⅞-in.	30	36	36
1-in.-1⅛ in..	27	31	33
1⅛-in.&larger	17	21	..

STEEL STOVE BOLTS

(F.o.b. plant; per cent off list in packages)

Plain finish ..... 63.5 & 10
Plated finishes ... 50 & 10

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:
- ¼-in. through ⅝-in... 50
- ¾-in. through 1 in... 43

Longer than 6 in.:
- ¼-in. through ⅝-in... 33
- ¾-in. through 1 in.... 13

SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam x 6 in. and shorter 46
1 in. and smaller diam. x over 6 in. 33

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller..... 41
¼-in. diam. & larger... 24
N.F. thread, all diams. . 18

RIVETS

F.o.b. midwestern plants

Structural ½-in., larger 7.25c
⅞-in., under .....43 off

Washers, Wrought

F.o.b. shipping point, to jobbers .....Net to $1 off

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

Inches Diam.	Inches Length	Cents per lb.
17,18,20	60,72	16.00
8 to 16	48,60,72	16.50
7	48,60	17.75
6	48,60	19.00
4, 5⅛	40	19.50
3	40	20.50
2½	24,30	21.00
2	24,30	23.00

CARBON

40	100,110	7.50
35	100,110	7.50
30	84,110	7.50
24	72 to 104	7.50
17 to 20	34,90	7.50
14	60,72	8.00
10,12	60	8.25

STAINLESS STEEL

(cents per pound)

Type	Sheets	C.R. Strip	Bars Wire Structurals
301...	37.50	30.50	28.50
302...	37.50	33.00	28.50
303...	39.50	36.50	31.00
304...	39.50	35.00	30.00
309...	52.00	52.00	41.50
316...	53.00	55.00	46.00
321...	45.50	44.50	34.00
347...	50.00	48.50	38.50
410...	33.00	27.00	23.00
416...	33.50	33.50	23.50
420...	40.50	43.50	28.50
430...	35.50	27.50	23.50
501...	24.00	22.50	11.50
502...	25.00	23.50	12.50

Baltimore, Types 301 through 347 sheets, except 309 E2.
Baltimore, bars, wire and structurals A10.
Brackenridge,Pa., sheets A4
Bridgeville, Pa., bars, wire, sheets & strip, except Type 309 strip quoted 51.00c U4.
Butler, Pa., sheets and strip except Types 303, 309, 416, 420, 501 & 502 A10.
Carnegie, Pa., strip except Type 416; Type 309 strip quoted 51.00c S18.
Cleveland, strip, except Type 309 quoted 51.00c, and except Type 416 A7.
Detroit, strip, except Type 309 M1.
Dunkirk,N.Y., bars, wire A4.
Duquesne, Pa., bars C3.
Gary, Ind., sheets except Type 416 C3.
Harrison, N. J., strip C18.
Massillon, all products, except Type 309 bars, wire & structurals quoted 42.00c, Type 501, 10.50c, Type 502 11.50c R2.
McKeesport, Pa., bars; sheets except Type 416, C3.
McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only F2.
Middletown, O., sheets and strip, except Types 303, 416, 420, 501 and 502 A10.
Midland, sheets & strip C18.
Munhall, Pa., bars C3.
Pittsburgh, sheets C18.
Reading, Pa., bars & strip except Type 309 bars quoted 42.00c C4.
So. Chicago, Ind., bars & structurals C3.
Syracuse, N. Y., bars, wire & structurals C18.
Titusville, Pa., bars U4.
Wallingford, Conn., strip, except 309, W2 quotes ¼-cent higher.
Washington, Pa., bars, sheets & strip except Type 309 strip quoted 51.00c J3.
Washington, Pa., Types 301 through 347 sheets & strip as listed except 303 & 309; 316 sheets 58.00c, strip 60.00c W4.
Watervliet, N. Y., structurals & bars A4.
Waukegan, bars & wire A7.
West Leechburg, Pa., strip, except Type 309 quoted 51.00c A4.
Youngstown, strip C8.

COAL, CHEMICALS

Spot, cents per gallon, ovens
Pure benzol 22.00
Toluol, one deg..19.00-24.75
Industrial xylol..20.50-26.50

Per ton bulk, ovens
Sulphate of ammonia..$45.00

Cents per pound, ovens
Phenol, 40 (carlots, returnable drums) 13.50
Do., less than carlots.14.25
Do., tank cars 12.50

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $37; less than 60%, $34. Imported, net ton, duty paid, metallurgical grade, $39-$40.

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh)

	Cents
Sponge Iron:	
98+% Fe, carlots..	15.00
Swedish, c.i.f. New York, in bags..7.40-8.50	
Electrolytic Iron:	
Annealed, 99.5% Fe	39.50
Unannealed, 99+% Fe	33.50
Unannealed, 99+% Fe (minus 325 mesh)	48.50
Carbonyl Iron:	
97.9-99.8%, size 5 to 10 microns..70.00-135.00	
Aluminum:	
Carlots, freight allowed	27.00
Atomized, 500-lb drums, freight allowed	30.00
Brass, 10-ton lots..23.25-26.25	
Copper:	
Electrolytic	27.75
Reduced	27.00
Lead	18.50
Manganese:	
Minus 100-mesh 52.00-55.00	
Minus 35 mesh	48.00
Minus 200 mesh....	56.00
Nickel, unannealed61.00-66.00	
Silicon 34.00-40.00	
Solder (plus cost of metal)	8.50
Stainless Steel, 302...	75.00
Tin	86.50
Zinc, 10-ton lots..15.25-18.00	

	Dollars
Tungsten:	
99%, minus 80 to 200 mesh, freight allowed, over 1000 lb	2.90
1000 lb	2.95
less than 1000 lb..	3.00
98.8%, minus 65 mesh, freight allowed.	
1000 lb and over..	2.90
less than 1000 lb..	3.00
Molybdenum:	
99%, minus 80 to 200 mesh, over 500 lb	2.25
200 to 500 lb	2.60
less than 200 lb...	2.75
82-88%, freight allowed, 2000 lb and over..	2.40
less than 2000 lb..	2.45
Chromium, electrolytic 99% Cr min.	3.50

METALLURGICAL COKE

Price per net ton

BEEHIVE OVENS

Connellsvll,fur...$13.00-13.50
Connellsvll,fdry.. 15.00-16.00
New River, foundry...18.00
Wise county, foundry .15.35
Wise county, furnace..14.60

OVEN FOUNDRY COKE

Kearney, N. J., ovens.$22.00
Everett, Mass., ovens
- New England, del.‡.22.70

Chicago, ovens 21.00
- Chicago, del. .....†22.45
- Detroit, del. 24.91

Terre Haute, ovens....21.20
Milwaukee, ovens 21.75
Indianapolis, ovens ...19.85
- Chicago, del. 23.32
- Cincinnati, del. 22.77
- Detroit, del. 23.75

Ironton, O., ovens 20.40
- Cincinnati, del. 22.71

Painesville, O., ovens .21.90
- Buffalo, del. 24.02
- Cleveland, del. 23.62
- Erie, del. 22.04

Birmingham, ovens 18.70
Philadelphia, ovens ...20.45
Neville Island, Pa., ovens 20.00
Swedeland, Pa., ovens.20.40
Portsmouth, O., ovens.19.50
Detroit, ovens 21.65
- *Detroit, del.* 22.65
- Buffalo, del. 22.95
- *Flint, del.* 24.00
- *Pontiac, del.* 23.04
- *Saginaw, del.* 24.40

Includes representative switching charge of: *, $1.05; †, $1.45, one-track charge being $1.20, two tracks $1.40, and three or more tracks $1.50. ‡ Or within $4.03 freight zone from works.

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WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		BARS				PLATES	
	H.R. 18 Ga., Heavier*	C.R. 15 Ga.	Galv. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140§	Standard Structural Shapes	Carbon	Floor
New York (city)	5.75	6.84	7.20	6.04	...	5.85	6.64	8.60	5.65	5.90	7.34
New York(c'try)	5.55	6.54	6.90	5.84	...	5.65	6.44	8.40	5.45	5.70	7.14
Boston (city) ..	5.75	6.68	7.19	5.98	...	5.80	6.50	8.70	5.75	6.08	7.28
Boston (c'try) .	5.55	6.48	6.99	5.78	...	5.60	6.30	8.50	5.55	5.88	7.08
Phila. (city) ..	6.45	6.60	6.95	5.90	...	5.75	6.46	8.40	5.50	5.70	6.80
Phila. (c'try) .	6.20	6.35	6.70	5.65	...	5.50	6.21	8.15	5.25	5.45	6.55
Balt. (city) ...	5.25	6.59	6.66	5.79	...	5.69	6.39	...	5.69	5.40	7.04
Balt. (c'try) ..	5.05	6.39	6.46	5.59	...	5.49	6.19	...	5.49	5.20	6.84
Norfolk, Va. ..	6.10	...	...	...	...	6.15	7.20	...	6.20	6.15	7.55
Wash. (w'hse).	5.46	...	...	6.00	...	5.90	6.62	...	5.90	5.61	7.25
Buffalo (del.)..	5.25	6.00	7.00	5.61	...	5.25	5.95	10.10††[5]	5.35	5.65	6.95
Buffalo (w'hse)	5.05	5.80	6.80	5.41	...	5.05	5.75	9.90††[5]	5.15	5.45	6.75
Pitts. (w'hse)..	5.05	5.80*	6.45-6.70	5.20	6.15	5.00	5.75	9.55††	5.05	5.15	6.40
Detroit (w'hse).	5.33	6.08*	7.09	5.49	...	5.39	6.03	9.86††[5]	5.44	5.59	6.68
Cleveland (del.)	5.25	6.00	7.15	5.44	6.20	5.32	5.95	8.31	5.37	5.52	6.87
Cleve. (w'hse).	5.05	5.80	6.95	5.24	6.00	5.12	5.75	8.16	5.17	5.32	6.67
Cincin. (w'hse).	5.32	5.84	6.29	5.49	...	5.39	6.10	9.90††[5]	5.44	5.59	6.75
Chicago (city) .	5.25	6.00*	6.90	5.30	...	5.20	5.85	9.75††[5]	5.25	5.40	6.60
Chicago (w'hse)	5.05	5.80*	6.70	5.10	...	5.00	5.65	9.55††[5]	5.05	5.20	6.40
Milwaukee(city)	5.39	6.14*	7.04	5.44	...	5.34	6.09	9.89††[5]	5.39	5.54	6.74
Milwau. (c'try).	5.19	5.94*	6.84	5.24	...	5.14	5.89	9.69††[5]	5.19	5.34	6.54
St. Louis (del.).	5.53	6.28	7.18	5.58	...	5.48	6.23	10.03††[5]	5.53	5.68	6.88
St. L. (w'hse).	5.38	6.13	7.03	5.43	...	5.33	6.08	9.88††[5]	5.38	5.53	6.73
Birm'ham (del.)	5.20[10]	5.95	6.30[2]	5.25[10]	...	5.15[10]	6.88	...	5.20[10]	5.35[10]	7.63[10]
Birm'hm(w'hse)	5.05[10]	5.80	6.15[2]	5.10[10]	...	5.00[10]	...	...	5.05[10]	5.20[10]	...
Omaha, Nebr. .	6.13‡	...	8.33	6.13	...	6.18	6.98	...	6.18	6.38	7.83
Los Ang. (city)	5.95	7.15	7.60	6.00	8.25	5.95	7.70	...	5.85	5.95	8.15
L. A. (w'hse).	5.80	7.00	7.45	5.85	8.10	5.80	7.55	...	5.70	5.80	8.00
San Francisco .	6.25[9]	8.60[2]	7.50[3]	6.75[9]	8.25[3]	6.15[9]	7.80[3]	...	6.00[9]	6.15[9]	8.10[9]
Seattle-Tacoma .	6.70[7]‡	8.15[3]	...	6.90	...	6.35	8.50	10.10	6.20	6.35[7]	8.40[7]
Kans. (w'hse) .	5.65	6.40	7.30	5.70	...	5.60	6.35	10.10	5.65	5.80	7.00

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded); § as rolled; †† as annealed. Base quantities, 2000 to 9999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 1000 lb and over; [1]—1500 lb and over; [2]—500 to 1499 lb; [3]—450 to 1499 lb; [4]—400 to 1499 lb; [5]—1000 to 1999 lb; [6]—1000 lb and over; [7]—300 to 999 lb; [8]—300 to 499 lb; [9]—400 to 3999 lb; [10]—500 to 9999 lb inclusive.

REFRACTORIES

(Prices per 1000 bricks, f.o.b. plant)

FIRE CLAY BRICK

Super Duty: St. Louis, Vandalia, Farber, Mexico, Mo., Olive Hill, Ky., Clearfield, or Curwensville, Pa., $107; Ottawa, Ill., $106. Hard-fired, $141 at above points, except $135, Ottawa, Ill.

High-heat Duty: Salina, Pa. $91; Woodbridge, N. J., St. Louis, Farber, Vandalia, Mexico, Mo., West Decatur, Orviston, Clearfield, Beach Creek, or Curwensville, Pa., Olive Hill, Hitchins, Haideman, or Ashland, Ky., Troup, or Athens, Tex., Stevens Pottery, Ga., Portsmouth, or Oak Hill, O., Ottawa, Ill., $86.

Intermediate-Heat Duty: St. Louis, or Vandalia, Mo., West Decatur, Orviston, Beach Creek, or Clearfield, Pa., Olive Hill, Hitchins, or Haideman, Ky., Athens, or Troup, Tex., Stevens Pottery, Ga., Portsmouth, O., Ottawa, Ill., $80.

Low-Heat Duty: Oak Hill, or Portsmouth, O., Clearfield, Orviston, Pa., Bessemer, Ala., $72; Ottawa, Ill., $70.

LADLE BRICK

Dry Press: Freeport, Merill Station, Clearfield, Pa., Irondale, Wellsville, O., Chester, W. Va., New Cumberland, W. Va., $60.

Wire Cut: Chester, W. Va., Wellsville, O., New Cumberland, W. Va., $58.

MALLEABLE BUNG BRICK

St. Louis, Mo., Olive Hill, Ky., $96; Ottawa, Ill., $90; Beach Creek, Pa., $86.

SILICA BRICK

Mt. Union, Claysburg, or Sproul, Pa., Portsmouth, O., Ensley, Ala., $86; Hays, Pa., $91; Joliet or Rockdale, Ill., E. Chicago, Ind., $95; Lehi, Utah, Los Angeles, $101.

Eastern Silica Coke Oven Shapes (net ton): Claysburg, Mt. Union, Sproul, Pa., Birmingham, $84.

Illinois Silica Coke Oven Shapes (net ton): Joliet or Rockdale, Ill., E. Chicago, Ind., Hays, Pa., $85.

BASIC BRICK

(Base prices per net ton; f.o.b. works, Baltimore or Chester, Pa.)

Burned chrome brick, $66; chemical-bonded chrome brick, $69; magnesite brick, $91; chemical-bonded magnesite, $80.

MAGNESITE

(Base prices per net ton, f.o.b. works, Chewelah, Wash.)

Domestic dead-burned, ⅝" grains; bulk, $30.50-$31; single paper bags, $35-$35.50.

DOLOMITE

(Base prices per net ton)

Domestic, dead-burned bulk; Billmeyer, Blue Bell, Williams, Plymouth Meeting, Pa., Millville, W. Va., Narlo, Millersville, Martin, Gibsonburg, Woodville, O., $12.25; Thornton, McCook, Ill., $12.35; Dolly Siding, Bonne Terre, Mo., $12.45.

ORES

LAKE SUPERIOR IRON ORE

Gross ton, 51½% (natural), lower lake ports. After Jan. 25, 1950, increases or decreases, if any, in upper lake rail reight, dock handling charges and taxes threon are for buyer's account.

Old range bessemer	$8.10
Old range nonbessemer	7.95
Mesabi bessemer	7.85
Mesabi nonbessemer	7.70
High phosphorus	7.70

EASTERN LOCAL ORE

Cents per unit, del E. Pa.

Foundry and basic 56.62% concentrates contract	16.00

FOREIGN ORE

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot	17.00
Long-term contract	15.00
North African hemitites	15.75
Brazilian iron ore, 68-69%	18.00

TUNGSTEN ORE

Wolframite, scheelite, net ton unit, duty paid	$20-$22

MANGANESE ORE

Long term contracts, nominal; nearby, 48%, duty paid, 79.8c-81.8c per long ton unit, c.i.f. U. S. ports; prices on lower grades adjusted to manganese content and impurities.

CHROME ORE

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore. Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African

48% 2.8:1	$32.50
48% 3:1	35.00-36.00
48% no ratio	26.00

South African Transvaal

44% no ratio	$17.00-18.00
45% no ratio	18.00-18.50
48% no ratio	26.00-27.00
50% no ratio	27.00-27.50

Brazilian

44% 2.5:1 lump	$32.00

Rhodesian

45% no ratio	$20.00-21.00
48% no ratio	28.00-29.00
48% 3:1 lump	36.00-37.00

Domestic—rail nearest seller

48% 3:1	$39.00

MOLYBDENUM

Sulphide concentrates per lb, molybdenum content, mines	$0.90

FERROALLOYS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton, $65, Palmerton, Pa.; $66, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $172 per gross ton of alloy, cl., packed, $184; gross ton lots, packed, $199; less gross ton lots, packed, $216; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., or Welland, Ont. Base price: $174, f.o.b. Birmingham and Johnstown, Pa., furnaces; $172, Sheridan, Pa.; $175, Etna, Pa. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, San Francisco, Portland, Oreg. Shipment from Chicago warehouse, ton lots, $214; less gross ton lots, $231 f.o.b. Chicago. Add or subtract $2.15 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Carload, lump, bulk, max. 0.10% C, 24.75c per lb of contained Mn, carload packed 25.5c, ton lot 26.6c, less ton 27.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Carload, lump, bulk 18.15c per lb of contained Mn, carload packed 18.9c, ton lot 20.0c, less ton 21.2c. Delivered. Spot, add 0.25c.

Manganese Metal, 2" x D (Mn 96% min., Fe 2% max., Si 1% max., C 0.2% max.): Carload lump bulk, 29c per lb of metal; packed, 35.5c; ton lot 31.25c, less ton lot 33.25c. Delivered. Spot, add 2c.

Manganese, Electrolytic: Less than 250 lb, 35c; 250 lb to 1999 lb, 32c; 2000 to 35,999 lb, 30c; 36,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn. Freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk, 1.50% C grade, 18-20% Si, 8.95c per lb of alloy, carload packed, 9.70c, ton lot 10.60c, less ton 11.60c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk, 20.5c per lb of contained Cr, c.l., packed 21.4c, ton lot 22.55c, less ton 23.95c. Delivered. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

(*Please turn to page* 165)

Good Demand Ahead for Metals

Outlook for nonferrous products strengthens as industry revives from coal strike. Lead price drops 1 cent as foreign supplies flood U. S. market

GOOD DEMAND appears to lie ahead for nonferrous metal products. With the coal miners' strike over, industry is resuming its fast pace to fill current orders and to catch up on business accumulated during the strike-enforced slowdown.

Copper, Brass—Home building, a big market for copper and brass, is at a phenomenally high level, the 80,000 nonfarm dwelling unit starts in January being an alltime record for that month and final figures expected to show an unseasonally high total for February. Requirements of copper for plumbing and wiring, and brass for hardware for them will be expressed over the next several months.

The automotive industry, another big consumer of copper and brass, continues to enjoy heavy demand after producing 23 per cent more cars in the first ten weeks of 1950 than in the corresponding period of last year, and spring, traditional season for a perk-up in buying, is not far off.

Sales of copper to domestic consumers have been at a good level and it is expected aggregate bookings for March delivery will exceed those of February which are believed to have been slightly over 100,000 tons. Settlement of the coal strike has stimulated interest in orders for April shipment of copper, and in some instances larger quantities are being sought than those purchased for March. In contrast to previous periods when consumers rushed in to order from 35,000 to 50,000 tons of copper within a few days, buying is currently spread out and orderly. The demand is consistent, however, and it is estimated that as much copper is being sold for delivery in April as for March.

Copper prices are unchanged.

Lead—This high rate of auto production is contributing substantially to demand for batteries, thereby generating demand for lead. Another strong factor in demand for lead is the big volume of replacement and expansion of underground networks of utility transmission lines. The overall lead requirements in the United States are insufficient, however, to absorb all of that metal being offered. Increased supplies of foreign lead were pressing for sale to American consumers at 0.5 to 2.25 cents below the U. S. price of 12 cents. As a result the lead price dropped to 11 cents, New York, at midweek.

Metal of European origin had been offered in the U.S. at 11.5 cents, New York, and lead for a lower grade from Japan had been available to U. S. industry at 9.75 cents a pound. These prices included the import duty of 1-1/16 cents a pound. Australia again is shipping lead to the U.S. but it is sold on the basis of the U.S. price prevailing when the metal arrives.

Large, unsold supplies of Mexican lead are meanwhile accumulating. Ordinarily half of Mexico's big lead production is marketed in Europe, the rest coming to the U.S., but Mexican producers want payment in dollars and with dollars scarce in Europe the demand there is sharply reduced. As a result the supply of Mexican lead for sale in the U.S. is far above normal.

Continued accumulation of foreign lead, particularly Mexican, tends to exert a depressive effect on the U.S. price.

The three-months-old strike at the Selby, Calif., lead smelter and refinery of American Smelting & Refining Co. was settled last week. Under an agreement reached between the company and the International Union of Mine, Mill & Smelter Workers the employees will get a wage increase of 10 cents an hour. The new contract will run to June 30, 1951, without any reopening clause. The plant, down since Dec. 1, has a capacity of about 6000 tons of refined lead a month.

Meanwhile the lead-silver mining properties of the Fresnillo Co. in Mexico were closed last week by a strike started by workers in connection with a new labor contract under negotiation. It was believed the strike would be of short duration.

Zinc—With the coal miners' strike over and steel producers returning to high-level operations the outlook is for resumption of activity at galvanizing plants, and a resultant need for zinc. This need should show steadiness because galvanized products, particularly sheets, are among the tightest in demand-supply position and not far away are spring and summer, traditionally seasons of heavy consumption of galvanized roofing and siding, roofing nails, spouting and fence.

Good demand for zinc is coming out of brass mills also.

Negotiations between management and labor to reopen the closed Park City, Utah, mines collapsed again early last week.

Smelter production of 69,639 tons of slab zinc in the U.S. in February approximated that of January when it was 68,948 tons. Monthly average in 1949 was 72,509 tons. Smelter shipments totaled 84,257 tons, and by exceeding production by 14,618 tons lowered stocks of 82,037 tons at the beginning of February to 67,419 tons at the end of the month. That was the lowest stock level since last May 1. The January and February shipments were substantially above 1949's monthly average of 66,395 tons.

Tin—Tin consumption was only slightly reduced by the coal miners' strike because tin plate producers, being under contract to deliver specified tonnages, kept operations going to as great a degree as possible. In addition to filling current requirements, tin plate producers are trying to help customers rebuild stocks used up during the steelworkers' strike of last fall.

Forward ordering of tin has been constricted, however, by confusion in tin prices. Buyers were reluctant to pay more for futures than for what the government was offering to sell prompts. Private sellers at one time last week were asking 74¾ cents a pound for May delivery and 74⅝ cents for June delivery of Straits and other brands of Grade A tin. The government, through the Reconstruction Finance Corp., would sell Grade A tin for prompt delivery at 74.5 cents. There were comments last week that the tin market in the U.S. is a government market and would remain so until RFC withdraws as a seller or by holding its price at 74.5 cents forces the Singapore market to decline.

Imports of pig tin into the U.S. in February amounted to 7247 tons, making a total of 12,918 tons for the first two months of this year, the Office of Domestic Commerce reports. Another large increase in the government's tin stocks is reported to have occurred last month.

Aluminum — Output of primary aluminum in the United States in 1949 is estimated at 603,462 tons, compared with peacetime's yearly peak of 623,456 in 1948, the U.S. Bureau of Mines reports. December's output of 41,161 tons was up 15 per cent over November, low month of the year. The last two months of the year were affected by a strike at two plants of a big producer. The strike ended early in December.

To find additional effective uses for aluminum in agriculture, Reynolds Metals Co. has founded the Reynolds Farm Institute with headquarters in Louisville. In addition to looking for new uses of the metal, the institute will instruct and guide farmers in the proper and most effective uses of it.

Can You Use It?

SCIENTISTS at the laboratories of Eagle-Picher Co., Joplin, Mo., are looking for a market for gallium, a little-known metal which will melt in the hand but not boil until a 3500-degree temperature is reached.

They are producing a considerable quantity of this unique, silvery material but have learned of no major use for it. Despite lack of demand the price is $1300 a pound.

Small quantities of gallium have been sent to laboratories over the country. So far the most important work on potential uses is being done by the Navy in experiments at Bethesda, Md., and as a result there is belief a radioactive isotopic form of gallium salts will be valuable in diagnosing and treating cancer of the bone.

Gallium is a by-product of extraction of lead and zinc in Missouri, Kansas and Oklahoma.

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NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 18.50c, Conn. Valley, Lake, 18.62½c, Conn. Valley.

Brass Ingot: 85-5-5-5 (No. 115) 16.75-18.25c; 80-10-10 (No. 305) 21.75c; No. 1 yellow (No. 405) 14.25-16.00c.

Zinc: Prime western 9.75c, brass special 10.00c, intermediate 10.25c, East St. Louis; high grade 10.85c, delivered.

Lead: Common, 10.80c; chemical, 10.90c; corroding, 10.90c, St. Louis.

Primary Aluminum: 99% plus, ingots 17.00c, pigs 16.00c. Base prices for 10,000 lb and over, f.o.b. shipping point.

Secondary Aluminum: Piston alloys 16.50-16.75c; No. 12 foundry alloy (No. 2 grade) 16.00-16.25c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 17.75-18.00c; grade 2, 17.25-17.50c; grade 3, 15.75-16.00c; grade 4, 15.25-15.50c. Prices include freight at carload rate up to 75 cents per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over, 20.50c, f.o.b. Freeport, Tex.

Tin: Grade A, prompt del., 74.62½c; March del. 74.62½c; April del. 74.62½c; May del. 74.62½c; June del. 74.62½c. Chinese 99% tin, prompt del., nominal.

RFC selling prices for prompt delivery, ex-dock New York or f.o.b. Texas City, Tex.: Grade A, 99.8% or higher (including Straits) 78.50c.

Antimony: American 99-99.8% and over but not meeting specifications below 24.50c; 99.8% and over (arsenic 0.05% max.; other impurities 0.1% max.) 25.00c; f.o.b. Laredo, Tex., for bulk shipments. Foreign, 99%: Chinese, 24.00c; English, Belgium, prompt, 25.00c, New York.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 40.00c; 25-lb pigs, 42.50c; "XX" nickel shot, 43.50c; "F" nickel shot or ingots, for addition to cast iron, 44.50c. Prices include import duty.

Mercury: Open market, spot, New York $71-$74 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $24.50 per lb contained Be.

Cadmium: "Regular" straight or flat forms, 2.00 del.; special or patented shapes, $2.15.

Cobalt: 97-98%, $1.80 per lb for 550 lb (keg); $1.82 per lb for 100 lb (case); $1.87 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York, 73.25c per oz.

Platinum: $66-$69 per ounce.

Palladium: $24 per troy ounce.

Iridium: $100 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill; based on 18.50-cent copper.)

Sheet: Copper 32.18; yellow brass 28.69; commercial bronze, 95%, 32.10; 90%, 31.61; red brass, 85%, 30.60; 80%, 30.12; best quality, 30.58; nickel silver, 18%, 42.27; phosphor-bronze, grade A, 5% 50.90.

Rods: Copper, hot-rolled 28.03; cold-drawn 29.28; yellow brass free cutting, 23.19; commercial bronze, 95% 31.79; 90% 31.30; red brass 85% 30.29; 80% 29.81.

Seamless Tubing: Copper 32.22; yellow brass 33.70; commercial bronze 90% 34.27; red brass 85% 33.51; 80% 33.03.

Wire: Yellow brass 28.98; commercial bronze, 95% 32.39; 90% 31.90; red brass, 85% 30.89; 80% 30.41; best quality brass 29.87.

Copper Wire: Bare soft, f.o.b., eastern mills, 500,000 lb lots 22.55, l.c.l. 23.17, c.l. 22.67; weatherproof, f.o.b. eastern mills, 100,000 lb lots 24.85, l.c.l. 25.60, c.l. 25.10; magnet, delivered, c.l. 28.50, 15,000 lb or more 28.75, l.c.l. 29.25.

ALUMINUM

Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	26.9	...	...
0.135-0.096	12-48	27.4	...	...
0.095-0.077	12-48	27.9	26.0	29.6
0.076-0.068	12-48	28.5	26.2	29.8
0.067-0.061	12-48	28.5	26.2	29.8
0.060-0.048	12-48	28.7	26.4	30.1
0.047-0.038	12-48	29.1	26.6	30.4
0.037-0.030	12-48	29.5	27.0	30.9
0.029-0.024	12-48	29.9	27.3	31.3
0.023-0.019	12-36	30.5	27.7	31.8
0.018-0.017	12-36	31.1	28.3	32.6
0.016-0.015	12-36	31.8	28.9	33.5
0.014	12-24	32.7	29.7	34.6
0.013-0.012	12-24	33.6	30.4	35.5
0.011	12-24	34.6	31.3	36.7
0.010-0.0095	12-24	35.6	32.3	38.0
0.009-0.0085	12-24	36.8	33.4	39.5
0.008-0.0075	12-24	38.1	34.6	41.1
0.007	12-18	39.5	35.9	42.9
0.006	12-18	41.0	37.2	47.0

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	—Hexagonal— R317-T4	—Hexagonal— 17S-T4
0.125	48.0	...	...
0.156-0.203	41.0	...	...
0.219-0.313	38.0	...	...
0.344	37.0	...	47.0
0.375	36.5	45.5	44.0
0.406	36.5	...	...
0.438	36.5	45.5	44.0
0.469	36.5	...	...
0.500	36.5	45.5	44.0
0.531	36.5	...	...
0.563	36.5	...	41.5
0.594	36.5	...	...
0.625	36.5	43.0	41.5
0.656	36.5	...	...
0.688	36.5	...	41.5
0.750-1.000	35.5	40.5	39.0
1.063	35.5	...	37.5
1.125-1.500	34.5	39.0	37.5
1.563	34.5	...	36.5
1.625	33.5	...	36.5
1.688-2.000	33.5	...	...
2.125-2.500	32.5	...	...
2.625-3.375	31.5	...	...

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more, $17.00 per cwt; add 50c per cwt, 10 sq ft to 140 sq ft. Pipe: Full coils, $17.00 per cwt. Traps and bends: List price plus 45%.

ZINC

Sheets, 15.50c f.o.b. mill, 36,000 lb and over. Ribbon zinc in coils, 15.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 14.00c; over 12-in., 15.00c.

NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 60.00c. Strip, cold-rolled, 66.00c. Rods and shapes, 56.00c. Plates 58.00c. Seamless tubes, 89.00c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 47.00c; Strip, cold-rolled, 50.00c. Rods and shapes, 45.00c. Plates, 46.00c. Seamless tubes, 80.00c. Shot and blocks, 40.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.312 in. in diameter, less than 25 lb, 52.00-56.00c; 25 to 99 lb, 42.00-46.00c; 100 lb to 4000 lb, 35.00-36.00c.

Plating Materials

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 25.50c; 5 tons and over 26.00c; 1 to 5 tons, 26.50c; less than 1 ton, 27.00c.

Copper Anodes: Base 2000 to 5000 lb; f.o.b. shipping point, freight allowed; Flat untrimmed 28.84c; oval 28.34c; cast 26.87c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 46.50c f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 18.00c; 1000 to 19,000 lb, 17.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 250 lb, 25.75c; over 250 lb, 24.75c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 56.00c; 10,000 to 30,000 lb, 57.00c; 3000 to 10,000 lb, 58.00c; 500 to 3000 lb, 59.00c; 100 to 500 lb, 61.00c; under 100 lb, 64.00c; f.o.b. Cleveland.

Nickel Chloride: 100-lb kegs, 26.50c; 400-lb bbl. 24.50c, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over 91.00c; 500 to 999 lb, 91.5c; 200 to 499 lb, 92.00c; less than 200 lb, 93.5c; ball, 1000 lb and over, 93.25c; 500 to 999 lb, 93.75c; 200 to 499 lb 94.25c; less than 200 lb, 95.75c f.o.b. Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 58.2c; 100 or 300 lb drums only, 100 to 500 lb, 49.9c; 600 to 1900 lb, 47.6c; 2000 to 9900 lb, 45.8c, f.o.b. Sewaren, N. J. Freight not exceeding St. Louis rate allowed.

Zinc Cyanide: 100-lb drums 38.00c, f.o.b. Niagara Falls, N. Y.; 40.50c f.o.b. Cleveland; 39.25c, del., Detroit and Philadelphia.

Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb 84.50c; more than 2000 lb, 82.50c, f.o.b. Carteret, N. J.

Stannous Chloride (Anhydrous): In 400 lb bbl, 70.80c; 100 lb kegs 71.80c, f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb, f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	15.50	15.50	14.75
Yellow brass	12.50	12.25	11.37½
Commercial Bronze			
95%	14.50	14.25	13.75
90%	14.25	14.00	13.50
Red brass			
85%	14.00	13.75	13.25
80%	13.62½	13.37½	12.87½
Best Quality (71-80%)	13.37½	13.12½	12.62½
Muntz Metal	11.50	11.25	10.75
Nickel, silver, 10%	14.50	14.25	7.25
Phos. bronze, A	16.75	16.50	15.50
Naval brass	12.00	11.75	11.25
Manganese bronze	12.00	11.75	11.12½

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, delivered eastern refineries, carload lots)

No. 1 copper 15.25; No. 2 copper 14.25; light copper 13.25; composition red brass 12.50; radiators 10.00; heavy yellow brass 9.50.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 15.25; No. 2 copper 14.25; light copper 13.25; refinery brass (60% copper) per dry copper content 13.50-13.75.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and brass: Heavy copper and wire, No. 1 13.50-13.75; No. 2 12.50-12.75; light copper 11.50-11.75; No. 1 composition red brass 11.00-11.25; No. 1 composition turnings 10.25-10.50; mixed brass turnings 6.25-6.50; new brass clippings 10.50-11.00; No. 1 brass rod turnings 9.25-9.50; light brass 6.00-6.25; heavy yellow brass 7.25-7.50; new brass rod ends 9.75-10.00; auto radiators, unsweated 8.50-8.75; cocks and faucets, 8.50-8.75; brass pipe 9.00-9.25.

Lead: Heavy 9.25-9.50; battery plates 4.25-4.50; linotype and stereotype 10.00-10.25; electrotype 9.00-9.25; mixed babbitt 9.25-9.50.

Zinc: Old zinc 4.25-4.75; new die cast scrap 4.00-4.50; old die cast scrap 3.00-3.25.

Tin: No. 1 pewter 39.00-41.00; block tin pipe 60.00-62.00; No. 1 babbitt 30.00-32.00.

Aluminum: Clippings 2S 10.50-11.00; old sheets 7.50-8.00; crankcase 7.50-8.00; borings and turnings 3.00-3.50.

DAILY PRICE RECORD

1949	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Mar. 9	18.50	10.80	9.75	74.625	17.00	24.50	40.00	73.25
Mar. 6-8	18.50	11.80	9.75	74.625	17.00	24.50	40.00	73.25
Mar. 2-4	18.50	11.80	9.75	74.50	17.00	24.50	40.00	73.25
Mar. 1	18.50	11.80	9.75	74.375	17.00	27.25	40.00	73.25
Feb. Avg.	18.50	11.80	9.75	74.352	17.00	27.318	40.00	73.25
Feb. 23-28	18.50	11.80	9.75	74.125	17.00	27.25	40.00	73.25
Feb. 21	18.50	11.80	9.75	74.25	17.00	27.25	40.00	73.25
Feb. 20	18.50	11.80	9.75	74.37½	17.00	27.25	40.00	73.25
Feb. 14-18	18.50	11.80	9.75	74.50	17.00	27.25	40.00	73.25
Feb. 10-11	18.50	11.80	9.75	74.375	17.00	27.25	40.00	73.25
Feb. 7-9	18.50	11.80	9.75	74.50	17.00	27.25	40.00	73.25
Feb. 2-6	18.50	11.80	9.75	74.375	17.00	27.25	40.00	73.25
Feb. 1	18.50	11.80	9.75	74.25	17.00	28.75	40.00	73.25

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del. New York; Aluminum primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

IRON AND STEEL SCRAP

Consumer prices, except as otherwise noted, including brokers' commissions, as reported to STEEL, Mar. 9, 1950; gross tons except as noted. Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

Mar. 9	$27.50
Mar. 2	27.33
Feb. 1950	27.52
Mar. 1949	34.60
Mar. 1945	19.17

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 Heavy Melt.	$31.00
No. 2 Heavy Melt.	28.00*
No. 1 Busheling	31.00*
No. 1 Bundles	31.00
No. 2 Bundles	24.00-25.00*
No. 3 Bundles	23.00-24.00*
Heavy Turnings	26.00-27.00
Machine Shop Turnings	*22.00-22.50†*
Mixed Borings, Turnings	*22.00-22.50†*
Short Shovel Turnings	25.00
Cast Iron Borings	24.00-25.00
Low Phos. Steel	*34.00-35.00**

Cast Iron Grades*

No. 1 Cupola Cast	34.00-35.00
No. 1 Machinery Cast	38.00-39.00
Charging Box Cast	31.00-32.00
Heavy Breakable Cast.	29.00-30.00

Railroad Scrap

No. 1 R.R. Heavy Melt	*33.00*
Axles	35.00-36.00
Rails, Random Lengths	35.50-36.00
Rails, 2 ft. and under.	39.00-40.00
Rails, 18 in. and under	40.00-41.00
Railroad Specialties	*35.50-36.00*
Angles, Splice Bars	*37.00-38.00**

* Nominal.
† Crushers' buying prices.

CLEVELAND

No. 1 Heavy Melt. Steel	$28.00-28.50
No. 2 Heavy Melt. Steel	25.50-26.00
No. 1 Busheling	28.00-28.50
No. 1 Bundles	28.00-28.50
No. 2 Bundles	22.00-22.50
Machine Shop Turnings	18.00-18.50
Mixed Borings, Turnings	21.00-21.50
Short Shovel Turnings.	21.00-21.50
Cast Iron Borings	21.00-21.50
Low Phos.	29.00-29.50
Cut Structurals	31.00-31.50

Cast Iron Grades

No. 1 Cupola	41.50-42.00
Charging Box Cast	38.00-39.00
Stove Plate	35.50-36.50
Heavy Breakable Cast.	31.00-31.50
Unstripped Motor Blocks	31.00-32.00
Brake Shoes	28.50-29.50
Clean Auto Cast	42.00-43.00
No. 1 Wheels	36.50-37.00
Burnt Cast	*33.00-33.50*

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.50-33.00
R.R. Malleable	38.50-39.00
Rails, 3 ft and under.	41.00-42.00
Rails, 18 in. and under	43.00-44.00
Rails, Random Lengths	38.00-39.00
Cast Steel	34.00-35.00
Railroad Specialties	35.00-35.50
Uncut Tires	36.00-37.00
Angles, Splice Bars	*41.00-41.50*

VALLEY

No. 1 Heavy Melt. Steel	$31.50-32.00
No. 2 Heavy Melt. Steel	29.00-30.00
No. 1 Bundles	31.50-32.00
No. 2 Bundles	24.50-25.50
Machine Shop Turnings	21.50-22.50
Short Shovel Turnings.	23.50-24.00
Cast Iron Borings	23.50-24.00
Low Phos.	32.50-33.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	33.00-33.50

PHILADELPHIA

No. 1 Heavy Melt. Steel	$23.50
No. 2 Heavy Melt. Steel	21.50
No. 1 Busheling	21.50
No. 1 Bundles	23.50
No. 2 Bundles	*18.50*
Machine Shop Turnings	15.50
Short Shovel Turnings	*18.00-18.50*
Mixed Borings, Turnings	15.00-15.50
Low Phos. Punchings and Plate, elec. fur. grade	26.50-27.50
Cut Structurals	25.50-26.00
Elec. Furnace Bundles.	24.50
Heavy Turnings	23.50
No. 1 Chemical Borings	29.00
Knuckles and Couplers	*29.00-30.00*
Steel car wheels	*29.00-30.00*

Cast Iron Grades

No. 1 Cupola Cast	30.00-31.00
No. 1 Machinery Cast.	36.00-37.00
Charging Box Cast	*34.00*
Heavy Breakable Cast.	*34.00*
Unstripped Motor Blocks	25.00
Clean Auto Cast	36.00-37.00
No. 1 Wheels	37.00
Malleable	38.00

CINCINNATI

No. 1 Heavy Melt. Steel	$27.00
No. 2 Heavy Melt. Steel	23.00
No. 1 Busheling	27.00
No. 1 Bundles	27.00
No. 2 Black Bundles	23.00
No. 3 Bundles	18.00
Machine Shop Turnings	14.00
Short Shovel Turnings	17.00
Mixed Borings, Turnings	16.00
Cast Iron Borings	17.00

Cast Iron Grades

No. 1 Cupola Cast	38.00
Charging Box Cast	36.00
Stove Plate	28.00
Heavy Breakable Cast.	32.00
Unstripped Motor Blocks	22.00
Brake Shoes	22.00
Clean Auto Cast	38.00
Drop Broken Cast	42.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	30.00
R.R. Malleable	33.00
Rails, Rerolling	34.00
Rails, Random Lengths	33.00
Rails, 18 in. and under	42.00

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 2 Heavy Melt. Steel	$21.00-22.00
No. 1 Bundles	*25.00-26.00*
No. 2 Bundles	20.00-21.00
No. 1 Busheling	*24.00-25.00*
Machine Shop Turnings	*13.00-14.00*
Mixed Borings, Turnings	*13.00-14.00*
Short Shovel Turnings	*15.00-16.00*
Cast Iron Borings	16.00-17.00
Punchings & Plate Scrap	*24.00-25.00*

Cast Iron Grades

No. 1 Cupola Cast	33.00-34.00
Heavy Breakable Cast.	29.00-30.00
Clean Auto Cast	35.00-36.00

BUFFALO

No. 1 Heavy Melt. Steel	$28.00-28.50
No. 2 Heavy Melt. Steel	25.50-26.00
No. 1 Bushelings	25.50-26.00
No. 1 Bundles	26.50-27.00
No. 2 Bundles	24.00-24.50
Machine Shop Turnings	18.00-18.50
Mixed Borings, Turnings	19.00-19.50
Cast Iron Borings	19.00-19.50
Short Shovelings	19.50-20.00
Low Phos.	29.00-29.50

Cast Iron Grades

No. 1 Machinery	35.00-36.00
No. 1 Cupola	30.50-31.50
Stove Plate	29.50-30.50
Malleable	31.00-32.00

Railroad Scrap

Rails, 2 ft. and under.	38.00-39.00
Scrap rails	35.00-35.50
Specialties	33.00-34.00

NEW YORK

(Brokers' buying prices f.o.b. shipping point)

No. 1 Heavy Melt. Steel	$20.50-21.00
No. 2 Heavy Melt. Steel	17.50-18.00
No. 1 Busheling	17.50-18.00
No. 1 Bundles	20.25-20.75
No. 2 Bundles	16.00
Machine Shop Turnings	10.50-11.00
Mixed Borings, Turnings	10.50-11.00
Short Shovel Turnings.	10.50-11.00
Punchings & Plate Scrap	19.50-20.00
Cut Structurals	19.50-20.00
Elec. Furnace Bundles.	19.50-20.00

Cast Iron Grades

No. 1 Cupola Cast	25.00-25.50
No. 1 Machinery	26.00-27.00
Charging Box Cast	25.50-26.00
Heavy Breakable	25.50-26.00
Unstripped Motor Blocks	20.00-21.00
Malleable	34.00

BOSTON

(F.o.b. shipping point)

No. 1 Heavy Melt. Steel	$20.00-20.50
No. 2 Heavy Melt. Steel	16.00-17.00
No. 1 Bundles	19.00-20.00
No. 1 Busheling	*18.50-19.00*
Machine Shop Turnings	10.00-11.50
Mixed Borings, Turnings	10.50-11.00
Short Shovel Turnings.	13.00-13.50
Bar Crops and Plate.	21.00-22.00
Punchings & Plate Scrap	21.00-22.00
Chemical Borings	19.00-19.50

Cast Iron Grades

No. 1 Cupola Cast	27.50-30.50
Mixed Cast	21.00-22.00
Heavy Breakable Cast.	24.50-25.50
Stove Plate	21.50-22.50
Unstripped Motor Blocks	17.50-18.50

CHICAGO

No. 1 Heavy Melt. Steel	*$28.00*
No. 2 Heavy Melt. Steel	*26.00*
No. 1 Bundles	*28.00*
No. 2 Bundles	24.00
Machine Shop Turnings	*18.00-19.00**
Mixed Borings, Turnings	19.00-20.00
Short Shovel Turnings.	20.00-21.00
Cast Iron Borings	19.00-20.00
Low Phos.	30.50-31.50
Elec. Furnace Bundles	27.00-28.00
Heavy Turnings	23.00-24.00
Cut Structurals	29.00-30.00

Cast Iron Grades

No. 1 Cupola Cast	40.50-41.50
Clean Auto Cast	41.50-42.50
No. 1 Wheels	*36.00-37.00*
Stove Plate	31.50-32.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	29.00-30.00
Malleable	35.00-36.00
Rails, Rerolling	*44.00-45.00*
Rails, Random Lengths	33.00-34.00
Rails, 2 ft and under.	39.00-40.00
Rails, 18 in. and under	40.00-41.00
Railroad Specialties	*32.00-33.00*
Angles, Splice Bars	*35.00*

*Nominal.

BIRMINGHAM

No. 1 Heavy Melt. Steel	$24.00
No. 2 Heavy Melt. Steel	22.00
No. 1 Busheling	22.00
No. 2 Bundles	20.00
Machine Shop Turnings	22.50
Mixed Borings, Turnings	17.00
Short Shovel Turnings	23.00
Cast Iron Borings	19.00
Bar Crops and Plate.	27.00-28.00
Cut Structurals	27.00-28.00

Cast Iron Grades

No. 1 Cupola Cast	35.00
Stove Plate	30.00
No. 1 Wheels	nominal

Railroad Scrap

No. 1 R.R. Heavy Melt.	25.00-26.00
R.R. Malleable	nominal
Rails, Rerolling	33.00-35.00
Rails, 3 ft and under.	nominal
Angles and Splice Bars	nominal

ST. LOUIS

No. 1 Heavy Melt. Steel	$28.00-29.00
No. 2 Heavy Melt. Steel	24.00-25.00
Machine Shop Turnings	14.00-15.00
Short Shovel Turnings.	18.00-19.00

Cast Iron Grades

No. 1 Cupola Cast	35.00-36.00
Charging Box Cast	29.00-30.00
Heavy Breakable Cast.	*29.00-30.00*
Brake Shoes	*28.00-29.00*
Clean Auto Cast	36.00-38.00
Burnt Cast	27.00-28.00

Railroad Scrap

R.R. Malleable	31.00-33.00
Rails, Rerolling	36.00-37.00
Rails, Random Lengths	30.00-31.00
Rails, 3 ft. and under.	35.00-36.00
Uncut Tires	27.00-28.00
Angles, Splice Bars	32.00-33.00
Railroad Specialties	30.00-31.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	18.00
Nos 1 & 2 Bundles	16.00
No. 3 Bundles	13.00
Machine Shop Turnings	9.00

Cast Iron Grades

No. 1 Cupola Cast	30.00-32.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	20.00
Rails, Random Lengths	20.00

SEATTLE

No. 1 Heavy Melt. Steel	$18.00
No. 2 Heavy Melt. Steel	18.00
No. 1 Busheling	15.50
Nos. 1 & 2 Bundles	16.00
No. 3 Bundles	nom.
Machine Shop Turnings	13.00
Mixed Borings, Turnings	13.00
Punchings & Plate Scrap	27.50
Cut Structurals	27.50

Cast Iron Grades

No. 1 Cupola Cast	25.00-27.50
Heavy Breakable Cast	25.00
Stove Plate	25.00
Unstripped Motor Blocks	18.00
Malleable	25.00
Brake Shoes	20.00
Clean Auto Cast	27.50
No. 1 Wheels	27.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	19.00
Railroad Malleable	25.00
Rails, Random Lengths	19.00
Angles and Splice Bars	19.00

LOS ANGELES

(F.o.b. car, Los Angeles)

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	18.00
Nos. 1 & 2 Bundles	16.00
No. 3 Bundles	nom.
Machine Shop Turnings	9.00
Mixed Borings, Turnings	9.00
Punchings & Plate Scrap	26.00

Cast Iron Grades

No. 1 Cupola Cast	30.00-33.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	20.00
Rails, Rerolling	32.00

HAMILTON, ONT.

(Delivered prices)

Heavy Melt.	$24.00
No. 1 Bundles	24.00
Mechanical Bundles	22.00
Mixed Steel Scrap	20.00
Mixed Borings, Turnings	18.00
Rails, Remelting	24.00
Rails, Rerolling	27.00
Busheling	18.00
Bushelings new factory, prep'd	22.00
Bushelings new factory, unprep'd	17.00
Short Steel Turnings	18.00

Cast Iron Grades

Cast	40.00-43.00*

* F.o.b. shipping point.

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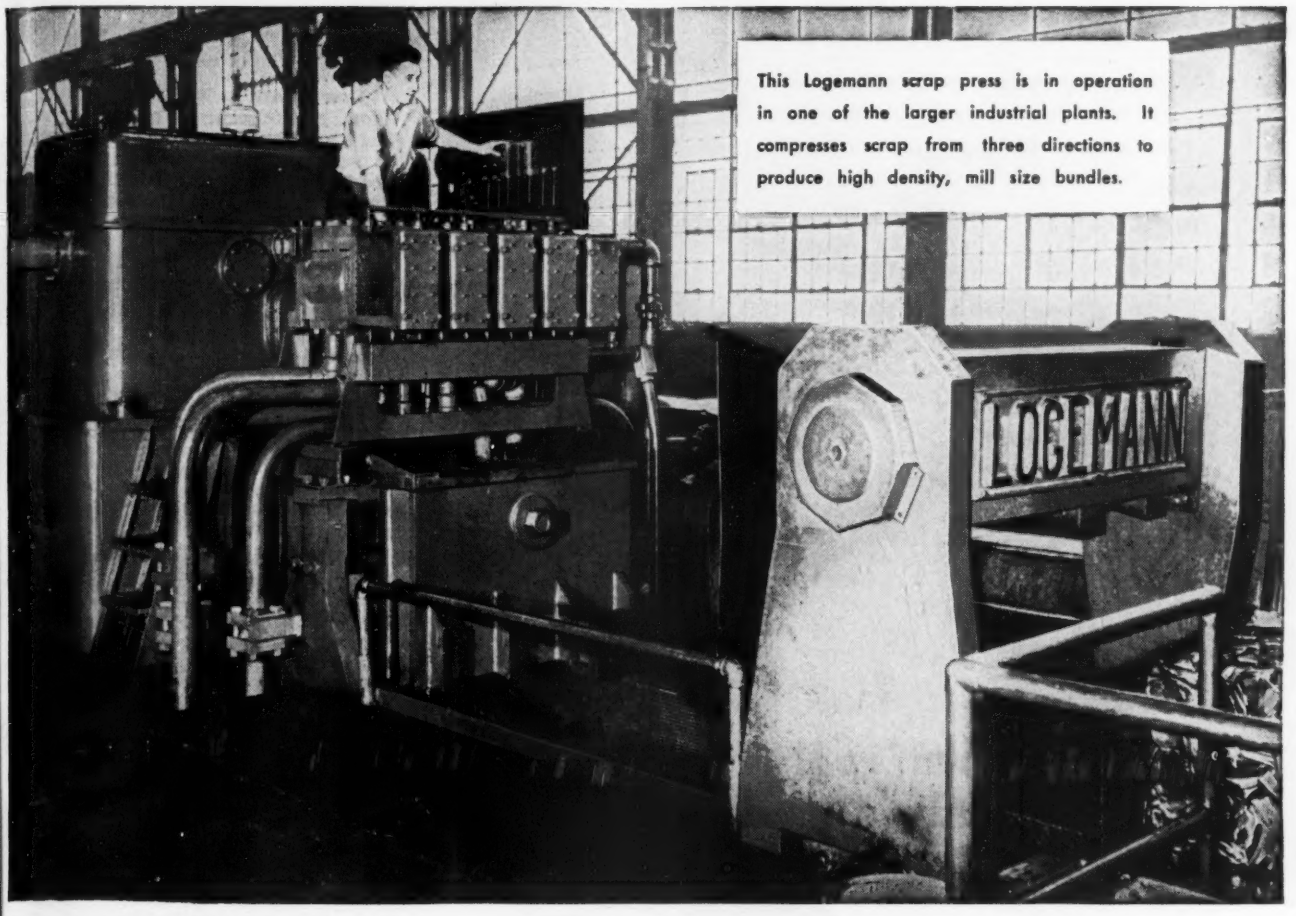

This Logemann scrap press is in operation in one of the larger industrial plants. It compresses scrap from three directions to produce high density, mill size bundles.

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Triple Compression..
Automatically Controlled

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. . . are built in a large range of sizes to meet specific conditions. Let Logemann's engineering service help you arrive at the most efficient and economical way of handling your scrap.

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Both two-ram and three-ram models are available with automatic controls or for manual manipulation.

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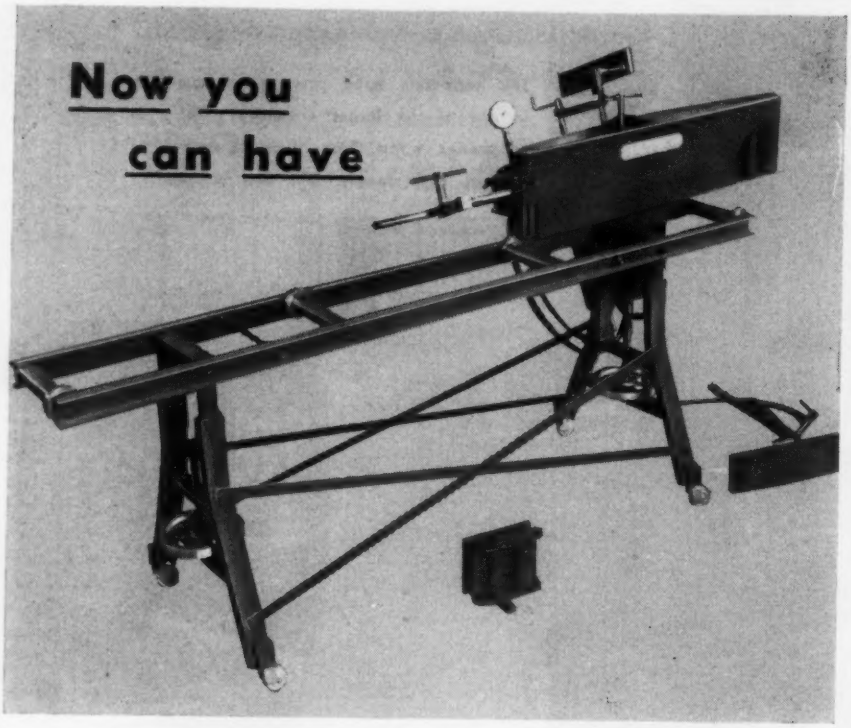

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Sheets Strip . . .

Sheet and Strip Prices, Page 147 & 148

New York — While specifications from manufacturers of small household appliances are slowing up, there is still a strong demand for sheets from manufacturers of heavier consumer durable goods, such as refrigerators, washing machines, kitchen cabinets, and even stoves. These, combined with automotive requirements, are sustaining pressure.

Sheet producers will not only enter the second quarter with substantial arrearages, but in all probability, the third quarter as well.

Cold finished sheet and strip supply is tight and stringency in galvanized sheets is almost as pronounced. But there is even a tightening in some of the specialties, which up until a few weeks ago hadn't been moving too well.

Philadelphia — Despite efforts of some of the larger mills to keep sheet operations at the highest level possible, their delivery promises have slipped from three to four weeks. Leading seaboard producer has announced new size extras for thickness and width on hot strip, Mar. 6.

Pittsburgh—Sheet and strip output of Jones & Laughlin is not expected to be resumed until early this week. Full production schedules will not be attained for at least 10 days. Operations at other producing plants have been well sustained. It appears metalworking operations will not be severely retarded by lack of finished steel. Sellers report hold-ups on shipments to Chrysler for first time since the strike got under way.

Weirton Steel Co. has revised cold-rolled sheet cutting to length extras, adopting the schedule instituted by Carnegie-Illinois last December for gage range of 20 gage and lighter.

Cleveland—Production lost due to operating difficulties directly traceable to the coal strike will accentuate sheet and strip supply shortages over coming weeks to some extent. It will take the mills 10 days to two weeks to regain their full operations stride and meanwhile the pressure for tonnage continues unabated. The mills are booked solidly through the second quarter and substantial first quarter tonnage will be carried over interfering with prompt shipments scheduled for April, May and June. As a result it is believed summer activity will be substantially better than had been expected until recently, barring unexpected tonnage cancellations. No letup in demand is in sight.

Cincinnati — District sheet mills point toward capacity schedules. Supply of hot iron for one mill was affected as furnaces went on light draft. Loss of tonnage was not excessive in this district. Even so, the stringency in sheet supply was increased. Demand is broad.

Chicago—Release from power restrictions has made many sheet consumers more anxious to receive flat-rolled steel on schedule. Further reduction in steelmaking last week points up the fact about a week to 10 days may be required before operations fully recover. Youngstown Sheet & Tube's sudden cessation of steelmaking at the beginning of last

UNIVERSITY OF MICHIGAN LIBRARIES

week may spell trouble for many consumers.

On the average, stocks at many metalworking plants are about 30 days' supply.

A 5000-ton a month increase in galvanized sheet capacity at Carnegie-Illinois will be a source of encouragement to users, but would seem to offer only slight relief from the acute shortage here presently.

Birmingham—Sheet demand is accentuated by mill shutdowns because of the coal shortage. Sheet and tin mills are the only two Tennessee Coal, Iron & Railroad Co. finishing mills not down.

Los Angeles—Producers are striving to restore normal operations, but it will be several weeks before full schedules can be attained. Inquiries are heavy. Sheets are on allocation, with deliveries averaging 8 weeks.

San Francisco—No curtailment was made in West Coast production of sheets and strip. Columbia Steel Co. is maintaining operations even though the Geneva plant, which supplies it with coils, was placed on standby basis because of the coal shortage.

Warehouse . . .

Warehouse Prices, Page 151

Philadelphia—With the coal strike settled steel distributors look for less active demand than anticipated a week ago. However, they expect higher daily volume this month.

Pittsburgh—Steel distributors anticipate substantial improvement in demand over coming weeks from two major sources: Coal mine maintenance work and equipment; normal mill consumers seeking to supplement stocks during interim finished steel production schedules are brought back to normal.

Cleveland — Ending of the coal strike brought no particular change in local warehouse market conditions. The distributors had been under only slightly increased pressure because of protective ordering. Consequently, return to normal results in no sharp letdown in volume. Except for sheets and strip, warehouse stocks are in good balance. Consumer pressure for the light, flat-rolled products is so heavy tonnage is moving into consumption just as quickly as it is received from the mills.

Cincinnati—Demand for warehouse steel is steady and inquiries indicate an early rise in tonnage for building purposes. Stocks excepting in sheets and plates are adequate.

Birmingham — Warehouse demand is heavy but many items are relatively scarce, especially sheets, bars, and plates. Mill idleness at Birmingham is aggravating the situation.

Los Angeles — Distributors report high level activity, with customers replenishing inventories. Strongest demand is for sheets, small pipe, cold-rolled bars, and reinforcing bars.

San Francisco—Warehouses report further slight stimulation in volume. Stocks are in good balance, with sheets in shortest supply.

Seattle — Warehouse trade outlook is improved with resumption of outdoor construction. Stocks are near normal except for galvanized sheets.

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Structural Shapes . . .

Structural Shape Prices, Page 147

Boston—First bridges for the 1950 Connecticut highway program close Mar. 13 with 485 tons involved. Bridge contracts closed account for 2100 tons. Prices quoted for fabricated and erected steel are weakened by competition with buyers taking full advantage of the drive for tonnage. An increasing number of school buildings are being estimated, most taking under 300 tons each. Boiler house, West Haven, Conn., Veterans Hospital, will be fabricated by Bethlehem Steel Co.

New York—An increasingly heavy amount of public bridge work is in prospect. Plans are expected out by end of March for two sections for New Jersey State turnpike—21,000 tons at Passaic and 16,000 tons at Hackensack. In addition, bids are being asked by New York State for 7000 tons of bridge work at Corning, and for 1800 tons for a hospital at Utica, N. Y. Fairly good sprinkling of new orders is noted, featured by 1550 tons for an apartment at 680 Madison Avenue.

Philadelphia — Structural shape delivery promises extend six to eight weeks and on wide flange sections, eight to 10 weeks. Prospects are for still further extension as the second quarter nears. Spurt in demand is anticipated.

Cleveland—The fact the mine strike ended before the steel mills were forced to drastically cut finishing mill operations augurs well for structural shape supplies. Fabricators now are assured of little interruption in mill shipments. In general shapes are in adequate supply though wide flange sections are not readily available. Fabricators are anticipating a noticeable spurt in demand from here on. Numerous school and institutional jobs are nearing the active stage. Price cutting on fabricated work continues.

Los Angeles—Junior beams and wide-flanged structurals are in good demand. Builders of pre-fabricated structures are using substantial tonnages of channels, beams, and deep-rib sheets.

San Francisco—Lack of large building projects continues to depress demand for structurals. Generally inventories are ample.

Seattle — Increased demand for structurals is noted, the week's placements exceeding 2000 tons. Award of about 1000 tons for the Potlatch Forests, Inc. pulp mill, Lewiston, Idaho, is reported to Stupp Bros., St. Louis, and 400 tons for the Washington State Metaline Falls highway bridge with Consolidated Western Steel Co. Pacific Car & Foundry Co., Seattle, will fabricate 400 tons for McKinley Manor apartment house, Fairbanks, Alaska. Washington State will receive bids Mar. 21 for a Grays Harbor County truss and girder span, involving 300 tons.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 147

Boston—Contracts for close to 6500 tons, include 5700 tons for two veterans hospitals, with bulk of the balance for highway bridges. Volume of concrete reinforcing bars up for estimates is heavier and the Metropolitan District Commission, Hartford closes Mar. 17 on 675 tons.

Los Angeles—Fabricators look for near-term demand to be the greatest experienced in months. February building permits in Los Angeles County totalled $23,173,435, against $13,752,850 in the like month last year. Projects in planning stage include a Beverly Hills development involving an $11 million Hilton hotel, a $6 million J. W. Robinson department store, and a Los Angeles development including three 13-story office buildings totaling $12 million.

San Francisco—Supplies are plentiful. No upswing in demand has become apparent yet, but a pickup in spring is expected.

Seattle—Rolling mills are on reduced schedules. Northwest Steel is operating four days this week and Bethlehem is operating two of five furnaces. Backlogs are fair. Largest contract pending involves 1210 tons, reinforcing, for Washington state highway snowsheds, low joint bidders C. V. Wilder Co. and Gaasland Co. Inc., Bellingham, $1,015,621. Washington state highway bids are called Mar. 21 on 200 tons.

Rails, Cars . . .

Track Material Prices, Page 149

Chicago — Three diesel powered stainless steel passenger cars were

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ordered from Budd Co. by the Chicago & Northwestern for suburban service. Total cost is approximately $415,000.

Steel Bars . . .

Bar Prices, Page 147

Boston — Slight improvement in buying of hot-rolled carbon bars has extended mill schedules well through May. Demand is well diversified, notably from forge shops.

New York—Hot carbon bar shipments are tightening, due to disruption of the coal strike, and to more active demand. Stepped up requirements of agricultural equipment manufacturers is having an indirect bearing as it is tightening schedules of many mills which compete in the East. Automotive requirements are sustained and recently specifications from machine tool builders have increased.

Warehouse stocks are in good balance with resultant lag in demand from that source and there is little real pick-up in specifications from railroad car builders. Bolt and nut makers are specifying more freely for fastenings required in building, but are not exerting much pressure for tonnage for manufacturing assembly fasteners.

Philadelphia — Leading bar sellers are now unable to book new tonnage for delivery before May. Requirements for the heavier products are slightly more active, and this is particularly true in hot carbon bars.

Pittsburgh—Cold-finished bar output is getting back to normal following lifting of restrictions on electric power consumption. Hot-rolled bar stocks are ample to sustain cold-drawing operations while hot mills are resuming full schedules. Output of cold-finished bars will be back to near-normal at the plants of Jones & Laughlin and Crucible Steel Co. of America by close of this week.

Cleveland—Fears of some consumers they would be forced to close down because of inability to obtain carbon bars disappeared with the ending of the coal strike. Producers now expect to quickly make up the lag in shipments resulting from the recent production interruptions, though it may be 10 days or two weeks before semifinished steel supplies get back to normal permitting full finishing mill operations. Current mill order backlogs are substantial, sufficient to support high-level production well into second quarter.

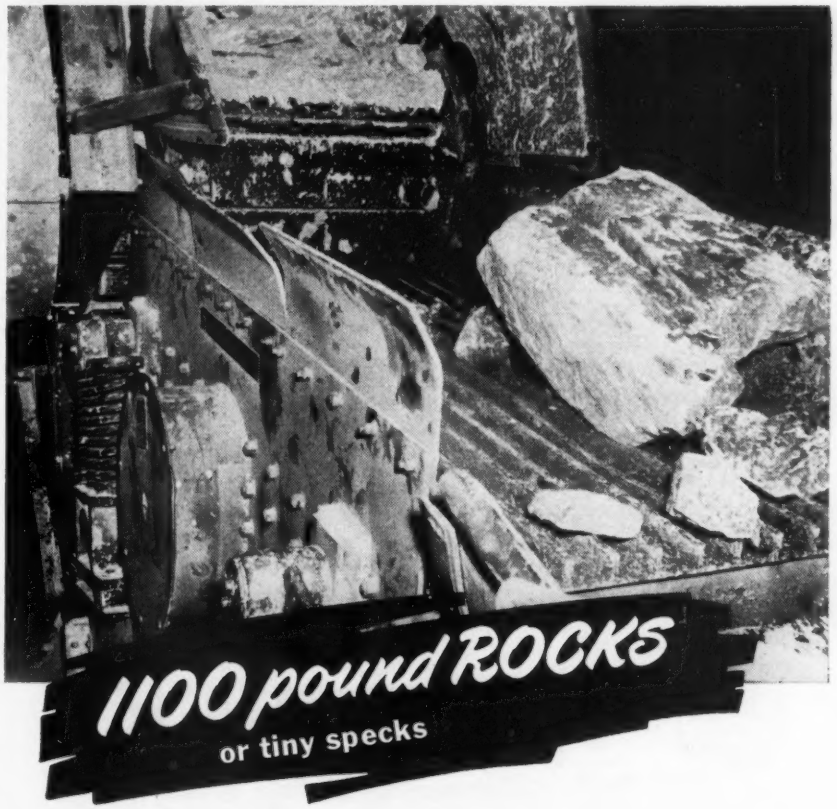
Chicago—Quotas have been taken through June for carbon bars at several mills here and enough tonnage was lost by two mills to expect some adjustment in monthly allotments will be necessary. No softness in bar business has been experienced since last summer's downturn.

Los Angeles—Bars are in good demand as users seek protection against shortages. Mills are quoting 6-8 weeks delivery. Requirements are particularly strong for ¼ and ½-in. flats, and 2-in. cold-rolled bars.

Semifinished Steel . . .

Semifinished Prices, Page 147

Youngstown—Shortage of pig iron will prevent return of high-level in-



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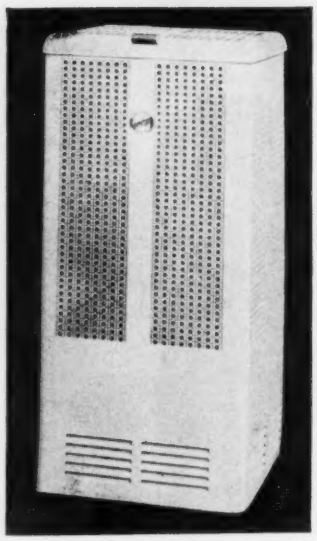

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got operations in this district until some time this week. Banked blast furnaces are being restored to production but it will take several days before hot metal becomes available. Meanwhile, stocks of cold metal have about vanished at several works. Finishing mill operations are being stepped up.

Scrap . . .

Scrap Prices, Page 154

Boston—With buying dull, steel scrap prices are largely unchanged. Depending on quality, busheling has a spread of $3, or $19 for No. 1 down to $16, shipping point, with No. 2 steel $16 to $17. Gap between No. 1 heavy melting and No. 2 is also wider than usual. Cast scrap is near a standstill with foundries showing little interest.

New York—Brokers' buying prices are unchanged with demand still spotty.

Philadelphia — Buying is hand-to-mouth. No. 2 bundles are slightly stronger at $18.50 delivered and short shovel turnings at $18-18.50. Knuckles and couplers and steel car wheels are higher at $29-30. Cast grades are unchanged except for an advance in charging box and heavy breakable to a flat $34 delivered.

Buffalo—Added concern over future price trends is noted among dealers with continued aloofness of leading consumers to place new contracts. Light movement of material from collection sources recently has had a stabilizing effect.

Pittsburgh—The market is devoid of new buying of openhearth grades. Mills apparently are not interested in making new commitments for No. 1 heavy melting dealer scrap until shipments are about concluded on old orders within the price range of $31 to $32. The last representative tonnage sale of No. 1 at $31 appears to be out of line with price levels currently paid by brokers ranging up to $33. Sizable portion of tonnage purchased by brokers at higher levels is earmarked for mills producing ingots under conversion deal arrangements.

Detroit—The market turned hotter than a pistol last week on the strength of new conversion deals for automotive accounts, negotiated by several electric furnace melters. Earlier ingot conversion contracts were pretty well cleaned up by the end of February, but the latest arrangements carry through second quarter. Prices of most steel grades are up from $1 to $2 per ton.

Cleveland—Return of banked blast furnaces to the active list is serving to put a check on optimism in the scrap market. Increased flow of hot metal will mean smaller consumption of scrap. Currently, the market is sluggish with demand limited. Prices are holding and not much change in the list, either up or down, appears in immediate prospect.

Cincinnati—The iron and steel scrap market is unchanged. At least no immediate disturbance resulted from settlement of the coal miner's strike. Nearby mills are well supplied with scrap, and dullness pervades the foundry trade.

Chicago—Stronger sentiment was evident late last week. One mill is

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expected to momentarily place orders for No. 1 heavy melting at $1 higher.

Demand is mounting from mills which had curtailed but are now bringing steelmaking operations back to prestrike level.

Recent dickering was on the basis of a large mill's purchase of major open-hearth grades. No. 1 heavy melting is firm at $28, No. 2 at $26. No demand presently exists for machine shop turnings and traders would accept $1-$2 less.

St. Louis—Scrap prices firmed in the wake of the coal strike settlement. Steel industry here was largely unhit by coal shortages, but scrap suppliers lost many outside customers temporarily. Heavy breakable cast and brake shoes moved up $1 in response to mild foundry buying.

Birmingham—Better grades of cast and most heavy melting items have shown considerable strength the past several weeks. This is attributable to scarcity of pig iron. But the general trend of the market is upward and price increases are in prospect.

Los Angeles—Although mill inventories have been whittled down, scrap demand remains sluggish. Columbia Steel Co. and Kaiser Steel Corp. are expected back in the market on a more substantial scale as operations step up. Foundry activity is slow.

Seattle—Turnover of steel scrap is below normal. Mills are buying sparingly. Supplies are more than ample. No. 1 and No. 2 heavy melting steel is unchanged at $18. More interest is shown in cast iron with No. 1 cupola firm at $25 to $27.50.

Wire . . .

Wire Prices, Page 149

Boston—High carbon specialty capacity is well taken up through the second quarter and some orders for longer-processed items are appearing beyond. Pressure for shipment is strong, bulk of consumers stressing low inventories. While there are scattered deferments due to the Chrysler strike, other automotive consumers are taking all tonnage available.

Pittsburgh—Significant tonnage losses in wire output will result from cessation of finishing mill operations by Jones & Laughlin Steel Corp. and curtailed production schedules of other producers. Order backlogs, extended two to three months on most merchant and manufacturers' wire items, will be further set back.

Cleveland—Settlement of the coal strike and return of more moderate weather conditions in this area was followed quickly by resumption of operations at various facilities of the American Steel & Wire Co. here which had been closed down for a few days. Two blast furnaces which had been banked are being restored to the active list and furloughed workers at the company's American and Cuyahoga works have been recalled. Demand for wire products is strong.

Birmingham—The wire mill, like most of Tennessee Coal, Iron & Railroad Co.'s other finishing mills, was temporarily hit by the coal mine strike. Result is the same as in plates since demand for most wire products has not slacked off much due largely to the mild winter.

Pig Iron . . .

Pig Iron Prices, Page 146

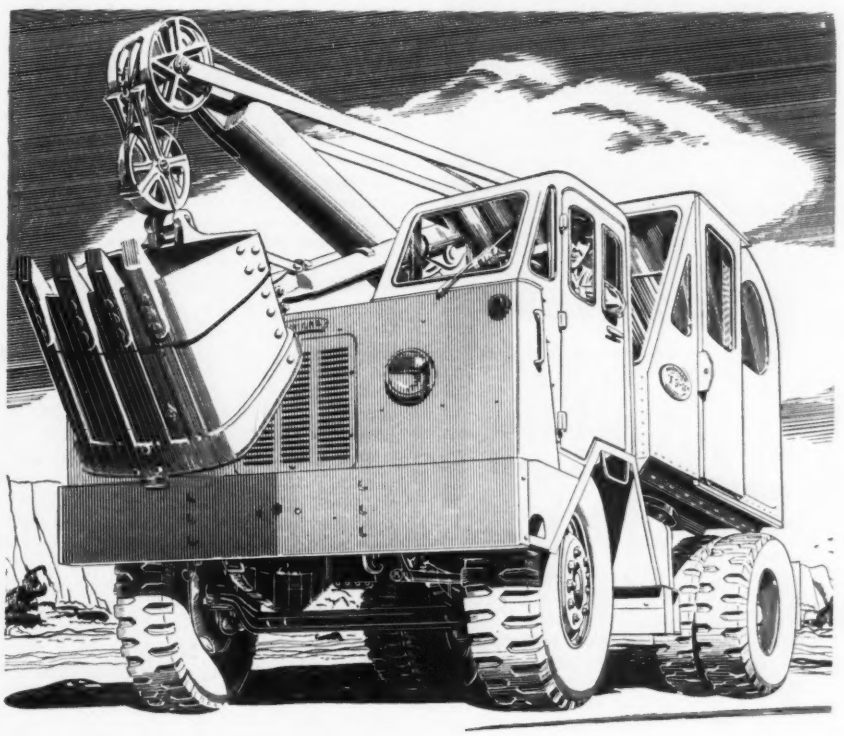
Boston — More consumers replenished inventories moderately last month and are not pressing for iron. Mystic has reduced production to about two-thirds capacity, near 9000 tons per month, and is withdrawing iron from stock this month to meet demand. Reserves are estimated slightly over 40,000 tons. Commodity rate on pig iron from Harbor Junction wharf to Phillipsdale, R. I., calls for reduction to 95 cents per gross ton from $1.77.

New York—With the coal strike over, most district foundries will be able to continue operations without having suffered interruption. Stocks are sufficient to carry them until shipments resume normal.

Requirements at no time recently have been too heavy because of the restricted rate of casting business. District foundries generally have been operating three to four days a week and in a number of instances on restricted daily production.

Philadelphia—Most district consumers of foundry iron escaped difficulty during the coal strike as stocks of iron, plus incoming shipments, were sufficient to meet needs. Number of shops in the area continue closed down by an AFL strike, now in its ninth week. Pig iron producers have used up most of their reserve stocks and may have to shift some blast furnaces to foundry iron.

Buffalo—The coal and coke pinch continues to retard blast furnace operations, but a better tone is apparent in March bookings for merchant pig iron which show minor improvement over the previous month. Except for those affected by the



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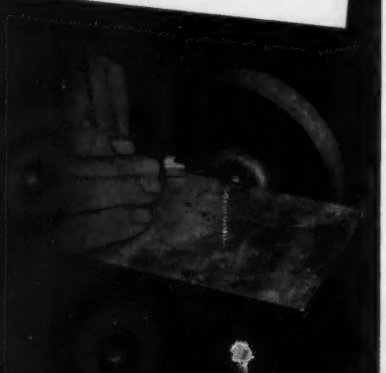

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Chrysler tieup, motor casters are on books for larger tonnages. Heating equipment manufacturers also are scheduled for increased deliveries.

Pittsburgh—Merchant foundry iron output was back to normal by week end, and with few exceptions integrated mills also had achieved prestrike operating pace. Pittsburgh Steel Co. has brought back into service a 600 per day unit, idle since spring of 1949. Other interests have additional furnaces ready for service to meet anticipated capacity steel production schedules through third quarter at least. Foundries contend inventories of pig iron are less than coke. This is particularly true among enamelware interests whose operations have been unusually well sustained the past six months. About 35 out of 47 blast furnaces are active.

Cleveland—With higher coke prices in prospect as result of the coal strike settlement, market speculation last week centered on what effect, if any, such a rise would have on pig iron prices. It is pointed out that pig iron was among the few products of the steel industry not advanced in price last December. Whether the industry can absorb a further increase in coke costs at this time is uncertain. Meanwhile, demand for merchant iron continues steady. Settlement of the coal strike appears to have removed consumer apprehension with respect to supplies. Pig iron production in the area is being restored to prestrike levels. American Steel & Wire Co. on Monday last week resumed blast on one of its idle stacks. It planned to activate its second furnace within a week. Republic Steel Corp. resumed the blast on one of its idled stacks at midweek, leaving one of five idle.

Cincinnati—Pig iron stocks supported the district foundry melt without undue distress through the coal stringency. However, a prolonged lag before normal shipments of iron are resumed might hurt.

Chicago—Pig iron and coke sellers now expect it may be July before users can build up inventories to adequate levels. No foundries were known to have ceased production here for lack of iron, but several went down for lack of coke or because of power curtailment.

Last week the shutdown of Youngstown's last blast furnace partially offset the addition of two Inland stacks to the active list.

St. Louis—Pig iron production, cut to 45 per cent a week before the coal settlement, will return to capacity by Mar. 15. Koppers Co., Granite City, Ill., the principal producer, returned its one banked furnace to blast last Tuesday. Coke-making operations, cut to 30 per cent, will be back at capacity Mar. 15.

Birmingham—The pinch in pig iron supply is acute. Improvement is expected soon, however, as banked furnaces of Woodward Iron Co., Sloss-Sheffield and Republic Steel Corp. are expected back in operation quickly.

Refractories . . .

Refractories Prices, Page 151

Pittsburgh—Sharp curtailment in refractory brick output, due to depleted coal stocks, will not hamper the steel industry's efforts to resume near capacity melting operations. Most refractory brick interests state those plants shut down will require 3 to 4 weeks before full production can be attained. Large stocks of standard brick sizes and grades should meet needs until then.

Plates . . .

Plate Prices, Page 147

Boston—Additional 2000 tons of 7/16-in. plates for electrically welded 36-in. pipe, plus approximately 4500 tons yet to be estimated, features fabricating demand. Contractor quoted $27 per foot, basing estimates on the tonnage to be welded by the Holyoke, Mass., shop, pipe being for a water line, Lynn, Mass., metropolitan district commission.

New York—Plate market undertone is improved. Sellers report more active demand. They see no early market gain in certain major consuming industries, such as railroad equipment, oil and gas, but note more interest among small tank builders.

Tank shops are competing keenly for business and are turning to the mills to help them out, if not price-wise, at least delivery-wise. Producers are confronted with requests for deliveries within two to three weeks.

Philadelphia—Smaller district plate mills are offering deliveries within three to four weeks, a somewhat tighter schedule than recently. Producers report demand from the heavy industries continues to lag. Certain larger producers that normally compete in this district are promising more extended deliveries due to production interruptions during the coal strike. One eastern mill reportedly booked 12,000 tons of skelp for a midwestern pipe fabricator.

Birmingham—Cessation of plate mill operations here and unavailability of but a small tonnage of plates from Republic Steel Corp.'s Gadsden operations caused a veritable log jam in the market. Clamor for plates is insistent.

Seattle—Plate fabricators report more interest. Considerable tonnages have been placed, the largest 2000 tons for an unstated project to Chicago Bridge & Iron Co. Contracts for more than 500 tons for the Potlatch Forests pulp mill were awarded Chicago Bridge & Iron Co. and Hydraulic Supply Mfg. Co., Seattle, the latter also having 100 tons, evaporators, for the Weyerhaeuser plant, Springfield, Oregon. Largest tonnage pending, 1700 tons for Detroit dam penstocks, is expected shortly.

Tubular Goods . . .

Tubular Goods Prices, Page 150

New York—Merchant pipe demand is stepping up. Most distributors are taking full quotas. A few weeks ago some were not. Direct consumers are specifying more freely. Producers anticipate an active market over remainder of this half.

Demand for boiler tubing reflects dearth of buying in locomotives and maritime equipment; also modest business in stationary engines. Business in mechanical tubing is fair.

Pittsburgh—Pipe demand should continue at present high levels

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through the summer despite adverse influence on demand stemming from excess oil stocks. Production schedules are recovering from the coal strike interruption.

St. Louis—Pipe demand is taking on new urgency as jobbers seek to stock up. Mild weather has kept sales abnormally high, with the result many fear spring construction spurt will catch them short.

Seattle—Demand for cast iron pipe continues subnormal but plans are in preparation for several sizable projects for early bidding. Demand for steel pipe is more active.

Tin Plate . . .

Tin Plate Prices, Page 148

Pittsburgh—Those tin plate producers forced to curtail production schedules the past few weeks were able to maintain shipments from mill warehouse stocks. Extent of the tin plate production loss is uncertain. In general, it was much less than in most other products. Near-capacity tin mill output was achieved by the close of last week among producers here with the exception of Jones & Laughlin which should reach prestrike pace early this week.

Iron Ore . . .

Iron Ore Prices, Page 151

Washington—Iron ore production totaled 2,816,084 gross tons in December, down from the preceding month, reflecting seasonal curtailments. Shipments from mines amounted to 1,648,522 tons, off 39 per cent. Stocks at all domestic mines were 1,648,522 tons on Dec. 31 compared with 5,433,210 the year preceding.

Lake Superior mines produced 1,282,868 tons but shipped only 73,030 tons in the month. Mine stocks on Dec. 31 were 3,824,969 tons.

Production in the southeastern states amounted to 696,432 tons and shipments 683,431 in the month. Stocks in the area on Dec. 31 amounted to 165,237 tons. Northeastern states production totaled 338,069 tons and shipments 325,749. Mine stocks at yearend were 1,285,116 tons.

December imports totaled 347,447 gross tons, off 47 per cent from the November tonnage.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 150

Cleveland—Increase of up to possibly 50 cents per ton in contract prices on oven coke is expected as result of the coal strike settlement. It takes from 1 1/3 to 1½ tons of coal to produce a ton of coke, so should coal prices rise 25 cents per ton, as expected, coke will rise proportionately.

With return of the miners to the pits pressure for coke is off somewhat reflecting an easing of tension over supplies on the part of foundries. High moisture content of stockpiled coal is holding down oven output.

Ford Motor still is seeking coke suppliers for the huge engine plant it is building here. This plant, expected to be ready for operation in October, 1951, will require up to 800 tons of coke daily.

Pittsburgh—Sales of furnace and foundry coke were made on the basis

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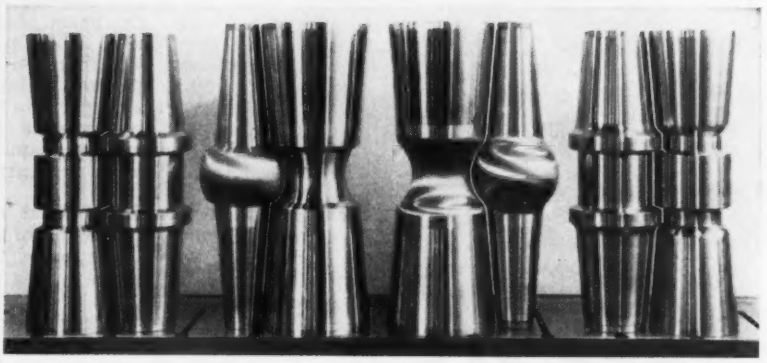

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of price in effect prior to Mar. 6, plus extent of increase now being studied to offset increased coal mining costs under revised UMW contract. Trade believes coal prices will advance 20 to 30 cents a ton. On basis of 1.6 tons of coal per ton of coke, plus higher wage costs, an increase in coke prices of 50 to 75 cents a ton is indicated. Heavy pressure persists for blast furnace coke to expedite resumption of mill operations; foundry oven coke demand is also up sharply past 10 days.

Chicago—Coke pushing could not be started at many batteries here until late in the week because of the lag in deliveries after the mines reopened. Every day's coke production loss spells greater hardship for users, few of whom in this district were adequately stocked before the strike. Milwaukee shortage has not been as extreme.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2250 tons, store addition, Jordan-Marsh Co., Boston, to Lehigh Structural Steel Co., Allentown, Pa.; George A. Fuller Co., Boston, general contractor.

1550 tons, apartment, 680 Madison Ave., New York, through John Lowery, that city, to Lehigh Structural Steel Co., Allentown, Pa.

1550 tons, power house, Newburgh, N. Y., to Ingalls Iron Works, Birmingham, Ala.

1000 tons, pulp plant, Potlatch Forests, Inc., Lewiston, Idaho, to Stupp Bros., St. Louis.

800 tons, head frames, Delaware viaduct, to American Bridge Co., Pittsburgh.

760 tons, Boys and Girls Infirmaries, State School, Newark, N. Y., to Lehigh Structural Steel Co., Allentown, Pa.

570 tons, state highway bridges, Lexington, Mass., to West End Iron Works, Boston; Gil Wyner Co., Inc., Malden, Mass., general contractor.

462 tons, alterations, Memorial Hospital, New York, to Grand Iron Works, that city.

400 tons, Washington state Metaline Falls highway bridge, to Consolidated Western Steel Corp., Seattle; general contractor Henry Hagman, Cashmere, Wash., low $548,360.

400 tons, McKinley Manor Apartments, Fairbanks, Alaska, to Pacific Car & Foundry Co., Seattle.

350 tons, boiler house, veterans' hospital, West Haven, Conn., to Bethlehem Steel Co.; Merritt-Chapman & Scott Corp., New York, general contractor.

335 tons, ventilator buildings, George Washington bridge, New York, to Schacht Steel Construction Co., that city.

300 tons, warehouse, Penn Mutual Life Insurance Co., Philadelphia, to Belmont Iron Works, Eddystone, Pa.

275 tons, plant addition, Scott Paper Co., Chester, Pa., to Frank M. Weaver & Co., Philadelphia.

250 tons, YWCA, Ridgewood, N. J., to Bergen Point Iron Works, Bayonne, N. J.

230 tons, apartment house, 64th Avenue and Queens Boulevard, Queens, New York, to Grand Iron Works Inc., that city.

175 tons, branch, Williamsburgh Savings Bank, Brooklyn, to Pecker Iron Works, Queens, New York.

150 tons, warehouse, C. J. Wiley & Sons, Teterboro, N. J., to Elizabeth Iron Works, Elizabeth, N. J.

140 tons, King county Cedar Mountain bridge, to Bethlehem Pacific Coast Steel Corp., Seattle; general contract to Modern Construction & Fabrication Co., Seattle, low $128,363.

135 tons, building, First Federal Savings & Loan Bank, First Avenue, New York, to Harris Structural Steel Co., that city.

Unstated, 300-ton traveling crane, Detroit dam power house, Oregon State, to Star Iron & Steel Co., Tacoma, low $136,700 to U. S. engineer, Portland.

STRUCTURAL STEEL PENDING

21,000 tons, state turnpike bridge work, Passaic, N. J., plans late March.

16,000 tons, state turnpike bridge work, Hackensack, N. J., plans late March.

7000 tons, state bridge work, Corning, N. Y., bids Mar. 29.

6000 tons, galvanized steel towers, power transmission lines, Central North Dakota system, Missouri River Basin project, Bureau of Reclamation; bids in April, two projects, each 3000 tons.

1800 tons, state hospital, Utica, N. Y., bids Mar. 22.

1600 tons, state highway bridges, Reading-Wakefield, Mass.; A. V. Taurasi Co., Somerville, Mass., low on general contract.

1600 tons, schedule 2, Valley Forge Expressway near Philadelphia; Francis A. Canuso & Son, Philadelphia, low on general contract.

1100 tons, schedule 1, Valley Forge Expressway, near Philadelphia; J. D. Morrissey, Philadelphia, low on general contract.

915 tons, two steel stringer bridges and approaches, Boston-Somerville (Sullivan Square project); Westcott Construction Co., North Attleboro, Mass., low on general contract.

650 tons, state highway bridges, Waltham-Weston, Mass.; J. F. Fitzgerald Construction Co., Boston, low on general contract.

500 tons, galvanized, substations, Central North Dakota system, Missouri River Basin project, N. Dakota; bids to Bureau of Reclamation, Denver.

485 tons, three state bridges, Connecticut, including 315 tons, 3-span composite welded girder span, 194 ft. Stiles St., New Haven, bids Mar. 13, Hartford.

325 tons, galvanized, structures, switchyards and transformer circuits, Hoover power plant, Boulder Canyon project, Ariz-Nev.; bids to Bureau of Reclamation, Denver.

300 tons, Washington state steel truss and girder highway bridge, Grays Harbor County; bids to Olympia Mar. 21.

300 tons, plant addition, Dupont interests, Niagara Falls, N. Y.; bids asked.

255 tons, Canyon Ferry power plant, Missouri Basin project, Mont.; bids to Bureau of Reclamation, Denver.

250 tons, store building for J. J. Newberry & Co., Spokane, Wash.; general contract for first unit to Walter G. Meyers, Spokane, low $385,783.

135 tons, including 40 tons reinforcing bars, 248-ft extension East switchyard, Coulee dam; bids to Bureau of Reclamation Mar. 30.

125 tons, galvanized, Thermopolis substation, Missouri River Basin project, Wyo.; bids to Bureau of Reclamation, Denver.

100 tons, two steel stringer bridges, Berkley, Mass.; Dwyer Bros., Newport, R. I., low on general contract.

100 tons, state bridge, Butler County, Pa., bids Mar. 24.

REINFORCING BARS . . .

REINFORCING BARS PLACED

3000 tons, veterans' hospital, West Haven, Conn., to Bethlehem Steel Co., Merritt-Chapman & Scott Corp., New York, general contractor.

2800 tons, veterans' hospital, Boston, to Northern Steel Inc., Medford, Mass.; McCloskey & Co., Philadelphia, general contractor.

200 tons, including 160 tons for Knik Arms apartments, Anchorage, Alaska, to Bethlehem Pacific Coast Steel Corp., Seattle.

REINFORCING BARS PENDING

1210 tons, Washington state Snoqualmie Pass snowsheds; C. V. Wilder Co. and Gaasland Co., Inc., Bellingham, low joint bid and award $1,015,621.

675 tons, deformed bars, Metropolitan District Commission, Hartford, Conn.; bids Mar. 17.

200 tons, Washington state highway projects; bids to Olympia, Mar. 21.

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PLATES . . .

PLATES PLACED

2000 tons, unstated project, to Chicago Bridge & Iron Co., Chicago.

400 tons, tanks for pulp plant, Potlatch Forests, Inc., Lewiston, Idaho, to Hydraulic Supply Mfg. Co., Seattle.

100 tons, digesters and other equipment, pulp plant, Lewiston, Ida., to Chicago Bridge & Iron Co., Chicago.

100 tons, penstocks for California-Oregon Power Co., Yamsey, Oregon, to unstated interest.

100 tons, evaporators for Weyerhaeuser plant, Springfield, Oregon, to Hydraulic Supply Mfg. Co., Seattle.

PLATES PENDING

2000 tons, 11,100 feet, 36-inch, electrically welded steel pipe, water line, Massachusetts District Commission, Lynn, Mass., S. Rotondi & Son, Stoneham, Mass., low on general contract, $388,620. Walsh-Holyoke Boiler Works, Inc., Holyoke, Mass., low on pipe.

PIPE . . .

STEEL PIPE PENDING

Unstated, 10,750 ft 10 and 6 in. and fittings King county district No. 42; bids to 1164 Olympic National Bldg., Seattle, Mar. 13.

Unstated, 15,000 ft 6 and 4 in., Mukilteo, Wash., water districts; bids Mar. 14, alternatives; R. E. Wolff, Seattle, engineer.

Unstated, 24,300 ft 8 and 6 in.; Malaspina & Co., Seattle, low $60,084, to La Connor, Wash., for steel pipe; alternatives also in.

Unstated, 91,300 ft 16 to 6 in., also alternatives; bids to Marjorie A. Miller, city clerk, Kennewick, Wash., Mar. 21; N. W. Hamer & Associates, Portland, engineers.

CAST IRON PIPE PENDING

1685 tons, 6 to 12-inch; bids in to Washington Suburban Sanitary Commission, Hyattsville, Md.

RAILS, CARS . . .

RAILROAD CARS PLACED

Chicago & Northwestern Railway, three stainless steel self-propelled passenger cars, from Budd Co.

FERROALLOYS

(*Continued from Page* 151)

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Contract, c.l., 8MxD, bulk, 22.0c per lb of contained Cr, c.l., packed 22.9c, ton 24.25c, less ton 26.0c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Contract, carload, lump, bulk, max. 0.03% C 31.85c per lb of contained Cr, 0.04% C 29.75c, 0.06% C 28.75c, 0.10% C 28.25c-28.5c, 0.15% C 28.0c, 0.20% C 27.75c, 0.50% C 27.5c, 1% C 27.25c, 1.50% C 27.1c, 2% C 27.0c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, C 0.75-1.25% max.). Contract, carload, lump, bulk 27.75c per lb of contained chromium, carload, packed 28.85c, ton lots 30.05c, less ton 31.85c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 5c for each 0.25% of N above 0.75%.

Low-Carbon Ferrochrome Silicon: (Cr 34-41%, Si 42-49%, C 0.05% max.) Contract, carload, lump, 4" x down and 2" x down, bulk, 20.50c per lb of contained chromium plus 11.30c per pound of contained silicon; 1" x down, bulk, 20.65c per pound of contained chromium plus 11.50c per pound of contained silicon. F.o.b. plant; freight allowed to destination.

Chromium Metal: (Min. 97% Cr and 1% Fe). Contract, carload, 1" x D; packed, max 0.50% C grade, $1.03 per lb of contained chromium, ton lot $1.05, less ton $1.07. Delivered. Spot, add 5c.

Silicon Alloys

25-30% Ferrosilicon: Contract, carload, lump, bulk, 17.00c per lb of contained Si; packed 18.40c; ton lot 19.50c, f.o.b. Niagara Falls,

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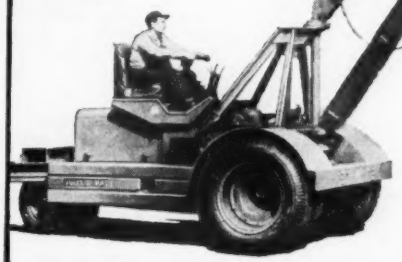

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50% Ferrosilicon: Contract, carload, lump, bulk, 11.3c per lb of contained Si, carload packed 12.9c, ton lot 14.35c, less ton 16c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 13.5c per lb of contained Si, carload packed 14.8c, ton lot 15.95c, less ton 17.2c. Delivered. Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk, 14.65-15.00c per lb of contained Si, carload packed 15.9c, ton lot 16.9c, less ton 18.05c. Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.). Add 0.7c to 85% ferrosilicon prices.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 16.5c per lb of contained Si, carload packed 17.7c, ton lot 18.65c, less ton 19.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.). Add 0.7c to above 90-95% ferrosilicon prices.

Silicon Metal: (Min. 97% Si and 1% max. Fe). C.l. lump, bulk, regular 19.0c per lb of Si, c.l. packed 20.2c, ton lot 21.1c, less ton 22.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 7.65c per lb of alloy, ton lots packed 9.05c, 200 to 1999 lb 9.40c, smaller lots 9.90c. Delivered. Spot up 0.5c.

Briquetted Alloys

Chromium Briquets: (Weighing approx. 3¾ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 13.75c per lb of briquet, carload packed 14.45c, ton lot 15.25c, less ton 16.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 10.45c per lb of briquet, c.l. packaged 11.25c, ton lot 12.05c, less ton 12.45c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 10.30c, per lb of briquet, c.l. packaged 11.1c, ton lot 11.9c, less ton 12.8c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.15c per lb of briquet, c.l. packed 6.95c, ton lot 7.75c, less ton 8.65c. Delivered. Spot, add 0.25c.
(Small size—weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.30c, c.l. packed 7.10c, ton lots 7.90c, less ton 8.80c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) 95.00c per pound of Mo contained. F.o.b. Langeloth, Pa.

Calcium Alloys

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%.) Contract, carload, lump, bulk 19.25c per lb of alloy, carload packed 20.05c, ton lot 21.55c, less ton 22.55c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 17.9c per lb of alloy, carload packed 19.1c, ton lot 21.0c, less ton 22.5c. Delivered. Spot add 0.25c.

Titanium Alloys

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max., Si 4% max., C 0.10% max.) Contract, ton lots 2" x D, $1.40 per lb of contained Ti; less ton $1.45. (Ti 38-43%, Al 8% max., Si 4% max., C 0.10% max.) Ton lot $1.28, less ton $1.35, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $160 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 3-4.5%.) Contract, $175 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

Vanadium Alloys

Ferrovanadium: Open-Hearth Grade (Va 35-55%, Si 8-12% max., C 3-3.5% max.) Contract, any quantity, $2.90 per lb of contained Va. Delivered. Spot, add 10c. **Crucible-Special Grades** (Va 35-55%, Si 2-3.5% max., C 0.5-1% max.), $3. **Primos and High Speed Grades** (Va 35-55%, Si 1.50% max., C 0.20% max.) $3.10.

Grainal: Vanadium Grainal No. 1, 93c; No. 6 63c; No. 79, 45c, freight allowed.

Vanadium Oxide: Contract, less carload lots, $1.20 per lb contained V_2O_5, freight allowed Spot, add 5c.

Tungsten Alloys

Ferrotungsten: (70-80%). Contract, 10,000 lb W or more, $2.25 per lb of contained W; 2000 lb W to 10,000 lb W, $2.35; less than 2000 lb W, $2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Contract or spot, 1000 lb or more, $2.90 per lb of contained W; less than 1000 lb W, $3.

Zirconium Alloys

12-15% Zirconium Alloys: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Contract, c.l., lump, bulk 6.6c per lb of alloy, c.l. packed 7.35c, ton lot 8.1c, less ton 8.95c. Delivered. Spot, add 0.25c.

35-40% Zirconinum Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Contract carload, lump, packed 20.25c per lb of alloy ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

Boron Alloys

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Contract, 100 lb or more, 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered. Spot, add 5c F.o.b. Washington, Pa.., prices 100 lb and over are as follows: Grade A (10-14% B) 75c per pound; Grade B (14-18% B) $1.20; Grade C (19% min. B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $4.25 per lb contained B, f.o.b. Philo, O., with freight not to exceed railroad freight allowed to destination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 0.90 to 1.15%). Net ton to carload, 8c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Other Ferroalloys

Ferrocolumbium: (Cb 50-60%, Mn 5% max., Si 8% max., C 0.5% max.). Contract, ton lot, 2" x D, $2.90 per lb of contained Cb, less ton $2.95. Delivered. Spot, add 25c.

CMSZ Mixes: (No. 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). Carload, 12 M x D, carload packed 19.0c per lb of material, ton lot 19.75c, less ton 21.0c. Delivered.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carload packed, 1" x D, 43c per lb of alloy, ton lot 45c, less ton 47c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, carload, packed ½" x 12 M, 16.5c per lb of alloy, ton lots 17.50c, less ton 18.5c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 17.00c per lb of alloy; ton lots 18.00c; less ton lots 19.50c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed, 14.25c per lb of alloy; ton lots 15.75c; less ton lots 17.00c f.o.b., Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al). Lump, bulk, carload 11.00c. Ton lots, bulk 11.50c, packed 11.75c. Less ton lots, packed 12.25c per lb of alloy, f.o.b. Philo, O., with freight not to exceed railroad freight allowed to destination.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base); carloads, f.o.b seller's works, Mt. Pleasant, or Siglo, Tenn., $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb, contained Mo, f.o.b. Langeloth and Washington, Pa., furnace, any quantity $1.13.

Technical Molybdic-Oxide: Per lb, contained Mo., f.o.b. Langeloth and Washington, Pa. packed in bags containing 20 lb of molybdenum. 95.00c.

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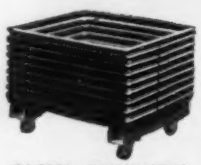
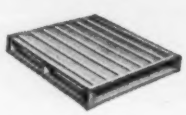
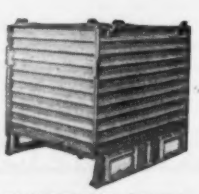


CASTER EQUIPMENT



PALLETS

CRANE BOX PLATFORMS



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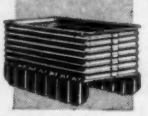

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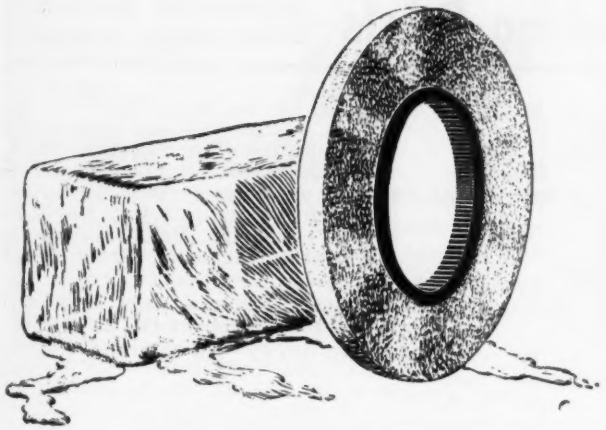


IT'S THE COST OF ICE
(AND GRINDING WHEELS)
THAT HURTS

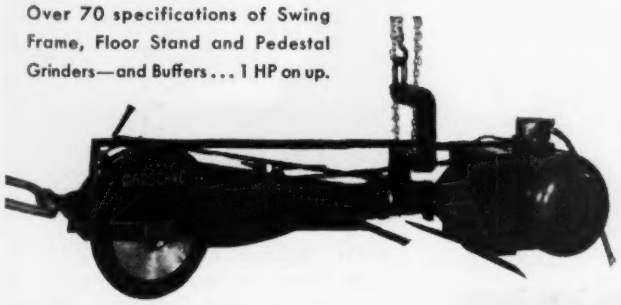
An electric refrigerator is priced higher than an ice box, but—you don't have to buy a new chunk of ice for it every couple of days. Size for size, Marschke Grinders may be priced higher than many other grinders on the market, but you don't buy as many wheels for them—actual tests prove they will save as high as 40% on wheel costs in many grinding operations.

Think a moment and you'll agree—those wheel bills are your real measure of daily grinding costs!

Well balanced . . . with bearing seats *precision ground and honed* to assure perfect spindle alignment and bearing fit . . . built to absorb the *vibration* which literally "melts away" grinding wheels . . . Marschke Swing Frame Grinders are cheaper in the long run, regardless of first cost.

Grinding wheels don't sell for peanuts; you know, too, that the trick is to remove more metal with less wheel wear. These facts have a bearing on your operating costs! An inquiry will bring you interesting data.

Over 70 specifications of Swing Frame, Floor Stand and Pedestal Grinders—and Buffers . . . 1 HP on up.



Shown: Marschke 24" Swing Frame Grinder.

MARSCHKE GRINDERS

VONNEGUT
MOULDER CORPORATION

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DECREASE TOOL GRINDING with MACCO 472

The Cutting Lubricant that reduces costs & increases profit!

On this milling job Macco 472 increased tool life 28% with 75% lubricant saving.

25% INCREASE IN TOOL LIFE—GUARANTEED

If Macco 472 would give you a decrease in tool room costs due to less frequent tool grinding — it would quickly pay for itself many times over.

Macco 472 will easily give you a sharp reduction in tool grinding. In addition, it is flatly guaranteed to increase tool life at least 25%! These are but two of the many cost reducing advantages you'll gain with Macco 472 — regardless of the machines you have . . . the tools you use . . . or . . . the metal you process.

Want convincing proof? Then test Macco 472. We'll supply it — no cost.

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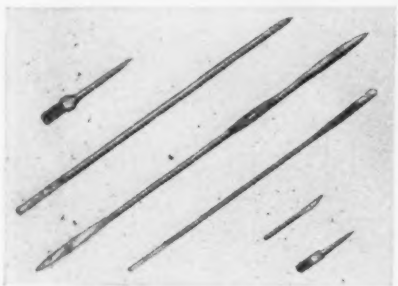

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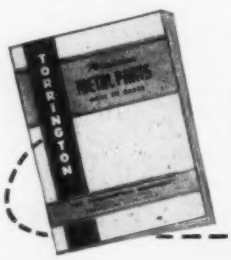

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6

Metalworking Briefs

CONSTRUCTION, ENTERPRISE
ORGANIZATIONAL CHANGES

International Business Machines Corp. received bids Mar. 7 for addition to office building, 415 N. Charles St., Baltimore. Henry P. Hopkins, 10 E. Mulberry St., is the architect.

Duplan Corp., Burnsville, N. C., plans to build a $1 million rayon and nylon manufacturing plant near this city.

Copland-Fowler Industries Inc., Hopedale, N. C., broke ground for a $1.5 million manufacturing plant here.

Start of work on the new $12.5 million addition to the Rivesville Power Station of the **Monongahela Power Co.,** Fairmont, W. Va., has been launched. Construction is to be completed about Sept. 1, 1951.

Shell Development Co. announces an expansion of its construction program now under way at its laboratories at Emeryville, Calif. The company has purchased for $100,000 a building adjacent to its laboratory site. Other projects in the construction program include additional pilot plants and a four-story office building.

Reliance Electric & Engineering Co. has moved its Chicago district sales office to larger quarters at 154 E. Erie St.

Eriez Mfg. Co., Erie, Pa.—magnetic separation equipment—appoints O'Brien Industrial Equipment Co., 1295 Folsom St., San Francisco, as a sales representative.

E. I. du Pont de Nemours & Co. Inc. was granted a building permit to erect a $125,000 addition to its Niagara Falls, N. Y., plant.

Evans & Howard Sewer Pipe Co., 5200 Manchester Ave., St. Louis, has awarded a contract to G. L. Tarlton Contracting Co. for construction of a factory building. Standley & Co. Inc. prepared the plans and specifications.

Hobart Bros. Co., Troy, O., named White Welding Supply Co., St. Louis, as sales representative for arc welders, electrodes and accessories.

W. P. Wooldridge Co., 1060 Howard St., San Francisco 3, is now representing **Heppenstall Co.,** Pittsburgh, in California, Montana, Idaho, Utah, Nevada, Arizona and New Mexico.

Multifinish Mfg. Co., Detroit, appointed Udylite Corp., same city, as national distributor for rotary tank magnetools.

Mahoning Valley Steel Co., Niles, O., a subsidiary of General Electric, is installing a new department to experiment with the manufacture of electric metallic tubing by induction welding. The new $100,000 department should be about ready for operation. A tube mill and plating line were purchased for the installation. The product to be manufactured is a light wall pipe or tube for encasing electric wires in factory and commercial buildings. John Hosack is president of Mahoning Valley Steel.

Sentry Co., Foxboro, Mass., appointed **Northeast Equipment Co.** as its Ohio representative in the sale of electric metal heat treating furnaces. Harlen F. Mura and Albert F. Freiheit of the Northeast company maintain offices at 1305 W. 105th St., Cleveland.

John D. Shaw, Walter V. Knopp, Catherine L. Clark organized **S-K-C Research Associates** with laboratories at 445 Fifth Ave., Paterson 4, N. J. The firm offers research, technical consultation and development work in powder metallurgy; process and plant design; mechanical, chemical and metallurgical engineering.

Oaks & Barrow Inc., Columbiana, O., is engaged in manufacture of galvanizing kettles, tin pots and annealing covers for any type annealing or galvanizing equipment.

HIGH PRESSURE, LOW TEMPERATURE: Here you see high pressure gas equipment in the Cryogenic Laboratory at Ohio State University, Columbus, O. The laboratory has achieved a .05 degree above absolute zero cold. As soon as a 1200 kw motor generator is installed to provide power for a large electromagnet, the laboratory is expected to produce temperatures within 3/1000 of a degree of absolute zero

Federal Tube Mills Inc. — seamless copper tubing — was chartered in Delaware. Capital of the firm was

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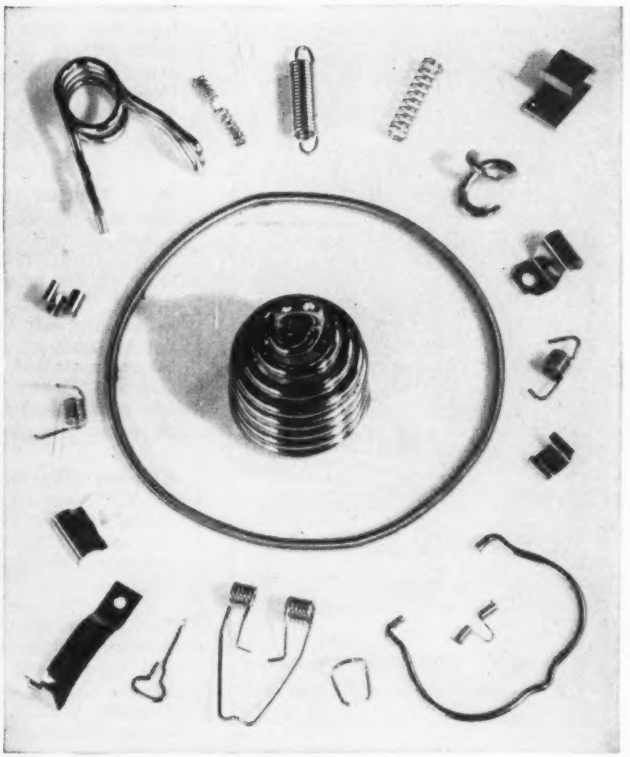

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At Lower Fuel Costs
With Less
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At Distinct Savings
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BAKER'S MAGDOLITE possesses superior chemical, physical, and mineralogical composition. Its grain-size particles are properly burned. Use it, and you are assured of minimum maintenance and repairs.

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JEBCO PRODUCTS SINCE 1889
61 YEARS OF SERVICE

listed at $50,000. Corporation Trust Co., Wilmington, Del., is serving as the principal office.

Bethlehem Pacific Coast Steel Corp. announces its new fabricating plant, an addition to its existing facilities in Seattle, will be completed June 1. The unit will specialize in structural steel items and in building electric transformers. The facility is included in Bethlehem's $100 million national expansion.

Roberts & Mander Corp., Hatboro, Pa., manufacturer of stoves for 47 years, plans to go out of business. Continued financial losses and inability to raise needed working capital was the reason given at a meeting of stockholders. The shutdown will affect about 500 employees. A competitor's offer to buy control of the company is under consideration.

Wagner Electric Corp., St. Louis, established two additional electrical sales offices, one in New Orleans, another in Davenport, Iowa. The additions are to provide more convenient field engineering service for users of Wagner electrical apparatus in the areas.

Taub Engine Corp. — engines — was charted in Delaware. Capital was listed at 1000 shares, no par value. Corporation Trust Co., Wilmington, Del., serves as principal office.

Solar Aircraft Co., San Diego, Calif., subcontractors of aircraft gas turbines, installed two rectangular pit General Electric ribbon resistor electric furnaces for annealing aft-frames of aircraft turbo-jet engines.

General Electric Co., Schenectady, N. Y., is apparently low to U. S. Engineer—$6,556,290—for manufacturing and installing four 3682 kva generators for McNary Dam, Washington.

The former plant of **Aluminum Co. of America,** Niagara Falls, N. Y., was put up for sale by Niagara Mohawk Power Corp., owner of the property. Reports that the structure was about to be demolished were denied.

Detroit Steel Corp. took another step in its $10 million Portsmouth Division expansion program when it let a contract to Rust Engineering Corp., Pittsburgh, for construction of a new $300,000 slab furnace.

Handler-Marcus Compressed Steel Corp., incorporated to manufacture and process steel, will be located in Columbus, O. The firm has already purchased new equipment.

Automatic Steel Products Inc., Canton, O., acquired **Linmar Products Corp.** of Chicago. The Chicago plant will be operated as the Linmar Division of Automatic Steel Products.

Donovan Wire & Iron Co., Toledo, O., established eight district offices to serve its customers in Ohio, Michigan, Illinois, Indiana, Wisconsin, Kentucky and adjoining states. Managers were appointed in five of the offices: Charles Monohan Jr. in Detroit, Donald E. Barnes in Lansing, Mich., Frank Coquillard in Chicago, Fred Woods in LaPorte, Ind., and William Martin in Bucyrus, O. Chester Devenow, vice president of Donovan, says managers in Dayton, O., Cleveland and Cincinnati will be named shortly.

American Brake Shoe Co. announces consolidation of all operations of its Canadian subsidiaries into one corporation, Dominion Brake Shoe Co. Ltd., a wholly owned subsidiary, with headquarters in Montreal, Que.

Cascade Iron Corp., Newcomerstown, O., was informed that Reconstruction Finance Corp. gave final approval to its application for a $90,000 loan. D. C. Hall of Canton, president of Cascade, says the sum plus more than $60,000 in additional private capital will allow the firm to proceed with construction of new ore feeding and drying equipment for its iron furnace at Newcomerstown.

National Acme Co., Cleveland, is spending $300,000 to replace obsolete or less efficient equipment, Fred H. Chapin, president of the company, reports. He says the present $300,000 budget for modernization work is just a start toward installing up-to-date labor saving equipment.

Syntron Co., Homer City, Pa.—vibrating material handling equipment, portable power tool equipment and allied items—moved its New York sales and engineering office to 1860 Broadway, New York 23.

Gerity-Michigan Corp., Adrian, Mich., was appointed national sales agent by **Prozite Co.,** manufacturer of buffing and polishing compositions. Prozite Co. is jointly owned by Poor & Co., Chicago, and Calumet & Hecla Consolidated Copper Co., Calumet, Mich.

York Corp. appointed these new distributors: Calcasieu Lumber Co., Austin, Tex.; Clayton C. Smith Co., Williamsport, Pa.; Hawes Electric Co., Huntington, W. Va.; Modernized Equipment Co., Cincinnati.

Berlin Sheet Metal Shop, 61 Clara, San Francisco, plans to install $10,000 of additional machinery and equipment.

Fischer & Porter Co. will conduct the second quarterly instrumentation course for 1950 at its Hatboro, Pa., plant Apr. 10-14. Manufacture, calibration, installation, operation and maintenance of the company's line of instruments will be covered.

Flexitallic Gasket Co., Camden, N. J., appointed these representatives: Moorlane Co., Tulsa, Okla., (Moorlane has offices in Kansas City, Kan., Amarillo and Wichita, Tex., Denver, and Oklahoma City, Okla.); Boiler Equipment Service Co., Atlanta; Lane Machinery Co. Inc., Buder building, St. Louis; Plant Equipment Inc., Minneapolis; Consultores Y Abastecedores Industriales, S. A., Dolores No. 17-301, Mexico City.

Thomas E. Millsop, president, **Weirton Steel Co.,** announces his company will compensate employees called for reserve military training.

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